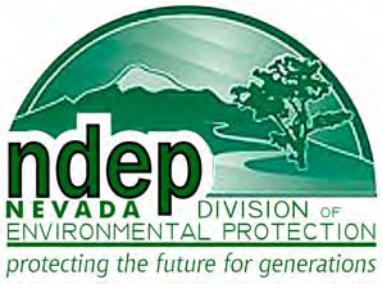
Revised Upgradient Wells Report
BMI Common Areas (Eastside)
Clark County, Nevada

Submitted to:



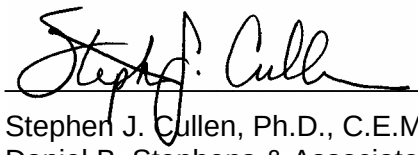
May 14, 2010

Prepared for:

Daniel B. Stephens & Associates, Inc.
260 Newport Center Dr., Suite 100, Newport Beach, California 92660

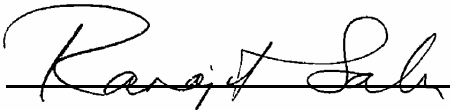
Responsible CEM for this Project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances.



May 14, 2010

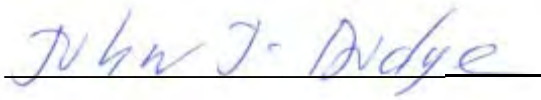
Stephen J. Cullen, Ph.D., C.E.M. (No. 1839)
Daniel B. Stephens & Associates, Inc.



May 14, 2010

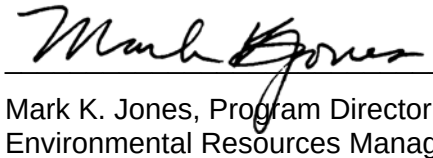
Dr. Ranajit Sahu, C.E.M. (No. EM-1699)
BRC Project Manager

Individuals Who Provided Technical Input to this Document



May 14, 2010

John J. Dodge, P.G.
Daniel B. Stephens & Associates, Inc.



May 14, 2010

Mark K. Jones, Program Director
Environmental Resources Management

Table of Contents

List of Figures

List of Tables

Table

List of Appendices

Appendix

1. Introduction

This report identifies and provides technical justification for the selection of upgradient wells for use in monitoring groundwater quality in the Shallow Zone at the Eastside area of the Basic Management, Incorporated (BMI) Common Areas/Complex (the "Site") in Clark County, Nevada (Figure 1). Proposed existing wells are identified to be used for upgradient monitoring purposes, and the rationale and criteria used to propose the wells are presented and discussed.

The scope of work for this report has previously been discussed between Basic Remediation Company (BRC) and Nevada Division of Environmental Protection (NDEP) representatives, in an NDEP meeting on February 4, 2009 and in written correspondence to BRC dated February 20, 2009. Preliminary NDEP comments dated January 8, 2010 regarding the draft of this report dated December 30, 2009 are addressed in this revised report (Appendix A); Appendix A also includes responses to NDEP comments dated August 5 and 7, 2009, regarding the July 24, 2009 draft of this report, and responses to NDEP comments dated February 20, 2010, regarding the February 11, 2010 draft of this report.

1.1 Location and Setting

The Site is located in Clark County, Nevada, and is situated approximately 2 miles west of the River Mountains and 1 mile north of the McCullough Range. As shown in Figure 1, the area surface topography slopes in a westerly to northwesterly direction from the River Mountains and in a northerly to northeasterly direction from the McCullough Range. Near the Site, the surface topography slopes in a northerly direction toward Las Vegas Wash.

The uppermost water-bearing zone (referred to as the Shallow Zone) is unconfined and occurs primarily in Quaternary alluvium (Qal). At some locations on portions of the Site, Shallow Zone groundwater is first encountered in the uppermost portion of the Tertiary Muddy Creek Formation (TMCf). This unconfined Shallow Zone groundwater generally flows in a northerly direction toward Las Vegas Wash. The Shallow Zone groundwater is generally continuous across the Site, but there are areas where Shallow Zone wells are dry. To distinguish between unconfined groundwater occurring in the two lithologies, the Shallow Zone is further divided into Layer 1 (Qal only) and Layer 2 (TMCf only).

Below the Shallow Zone, deeper groundwater occurs in sporadically encountered lenses under pressure in the Middle Zone, designated between approximately 90 and 270 feet below grade. A coarser-grained facies of the TMCf occurs off-site and in the southwest portion of the study area (at Location 27, for example). The proportion of coarser-grained sediments in the upper portion of the TMCf decreases to the north beneath the Site. This more permeable TMCf facies is interpreted as being caused by an influx of slightly coarser alluvial deposits into the older lacustrine depositional environment. One possible ramification of the presence of these coarser TMCf sediments near the southwestern border of the Site is that they may serve as a potential pathway for chemicals to migrate into the TMCf.

Deep Zone groundwater is generally continuous across the Site and is characterized with wells screened below 270 feet below ground surface (ft bgs) to a maximum nominal depth of 400 ft bgs. Groundwater elevation data from the last several rounds of groundwater monitoring (2006 through 2009) show that Deep Zone groundwater is confined, and the potentiometric surface of Deep Zone groundwater is oriented generally north toward Las Vegas Wash (MWH, 2008).

Vertical gradients at the Eastside area, as measured in the six Eastside monitoring events, have been generally upward. A summary table and figure of vertical gradient data is presented in the BRC report entitled, *Evaluation of Hydrogeologic Zone Connectivity Through Tritium and Stable Isotope Sampling and Analysis*" dated December 29, 2009 (DBS&A, 2010).

The generally upward gradient condition is consistent with the position of the Site at the relatively distal end of two coalescing alluvial deposits from the McCullough Range and the River Mountains. In general, high-energy alluvial sediments are deposited near their source, resulting in a geologic profile dominated by coarser-textured soils that are conducive to downward recharge of precipitation and mountain runoff. At more distal locations, it is common to encounter lower-energy alluvial sediments that result in a geologic profile dominated by finer-textured soils. The distal portions of alluvial deposits often comprise pressure zones where confining or semiconfining zones exist. Water in these zones is often laterally recharged at depth, resulting in pressure buildup that is sustained by the head of water created in the upslope vertical recharge zones. At more proximal locations, such as the off-site plants area, the gradient would be expected to be more typically downward. For example, downward vertical gradients have been measured in well pairs AA-01/MCF-01B (DBS&A, 2010).

Separate NDEP-approved project documents provide further information regarding area geology and hydrogeology, soils, history, and investigations completed to date (e.g., BRC et al., 2007; DBS&A, 2010).

1.2 Objective

The objective of this report is to present and justify the criteria used in the selection of the upgradient wells for monitoring groundwater quality in the Eastside area. Upgradient wells need to be designated at the Site in order to document and evaluate the quality of groundwater flowing onto the Site from off-site areas. Data from the upgradient wells can then be compared to data from on-site wells, along with comparison to state and federal water quality standards, to assist in the evaluation of Site impacts. Upgradient well data will also be used, in part, for remedial decision-making. As discussed in Section 2.1, it is not possible to install background monitoring wells at this Site. As a result, proposed upgradient wells will be used for data evaluation.

2. Upgradient Well Selection

The upgradient wells are located according to the following selection criteria:

- Hydraulically upgradient
- Along the majority of the upgradient site boundary
- Where off-site upgradient groundwater impacts, if present, are well characterized

Proposed upgradient wells must also be properly constructed to represent the hydrogeologic zone of interest. To qualify as Shallow Zone upgradient wells at the Site, the proposed wells must be adequately screened in the Shallow Zone. At the Eastside area, the following wells meet the criteria listed above (Figure 2) (Appendix B):

- AA-01
- AA-27
- AA-UW-1
- AA-UW-2
- AA-UW-3
- AA-UW-4
- AA-UW-5
- AA-UW-6

2.1 Groundwater Occurrence and Flow Direction

Figure 2 presents a regional map of the Shallow Zone potentiometric surface at the Site based on 2009 data. As discussed in Section 1.1, Shallow Zone groundwater occurs in both the Qal and the uppermost TMCf at the Site and is therefore further divided into Layer 1 (Qal only) and Layer 2 (TMCf only). Flow direction in the Shallow Zone is directed generally to the north toward Las Vegas Wash.

Flow direction has been roughly consistent over the last several rounds of water level measurement at the Site, completed in 2006, 2007, 2008 (MWH, 2008) and 2009. As shown on Figure 2, the proposed upgradient wells are located at the southern, southwestern, and southeastern boundaries of the Eastside area, and are well distributed along the Site perimeter in this area. This portion of the Site perimeter is the upgradient boundary of the Eastside area.

Several soil borings were completed in the off-site upgradient areas as part of the background metals investigation (BRC and ERM, 2009a) (Appendix B). Based on these borings, it appears that Shallow Zone groundwater occurs at much deeper depths further upgradient and is absent in the Qal further upgradient to the east. This relationship is illustrated in Figure 3, which shows a cross section through well AA-UW-6 to the northwest and southeast. As identified by wet soil logged in the field, groundwater was encountered in only 2 of the 23 borings. Groundwater was encountered at 140 ft bgs in boring DBSA-17 and at 84.7 ft bgs in boring DBSA-20.

The other background metals soil borings (except DBSA-33) were drilled between 80 and 160 ft bgs, but only moist soil was logged (boring DBSA-33 was terminated at 32.5 feet when the TMCf was encountered). Since groundwater occurs at deeper depths further upgradient and off-site, additional wells installed in these areas would likely be screened in a different hydrogeologic unit than the existing on-site wells. The proposed upgradient wells are screened in the same hydrogeologic unit as on-site Shallow Zone wells (Table 1, Appendix B). Proposed upgradient wells AA-UW-1, -2, -4, -5, and -6 are installed in Layer 2 of the Shallow Zone (screened in the TMCf only), in which groundwater first occurs along the eastern Site boundary. Wells AA-01, AA-27 and AA-UW-3 are screened in Layer 1 (Qal only), in which groundwater first occurs along the western Site boundary.

Appendix C (Figure C-1) contains a 2006 regional groundwater flow map prepared by TIMET (2007) that covers the Eastside area as well as adjacent properties upgradient to the south and west. The direction of groundwater flow in the regional flow map is also oriented generally to the north toward Las Vegas Wash.

Upgradient anthropogenic complexities introduced in the BMI Complex over the years (such as barrier walls, extraction well fields, and injection trenches) may have altered groundwater flow patterns. It is also noted that deep drilling, sampling, and well completion beneath the Qal/TMCf

contact in the BMI Complex has been sparse. Thus, only limited conclusions can be drawn regarding whether deeper chemical impacts and flow paths within the BMI Complex may be affecting chemical transport in the region.

Based solely on elevation, the upper Middle Zone at the plants area corresponds to the Shallow Zone at BRC Eastside, because the plants area is topographically higher than the BRC Eastside property. That is, 130 feet below grade at the plants area, which is approximately 1,700 feet in elevation above mean sea level, corresponds to approximately 50 feet below grade at the Eastside property. As a result, Middle Zone and Layer 2 Shallow Zone impacts at the plants area may be contributing to Shallow Zone Layer 1 impacts at the Eastside. As discussed in the revised isotope report dated April 21, 2010 (DBS&A, 2010), the plants area is located closer to the regional recharge area, while the BRC Eastside is located in the "pressure area" (Figure 4).

2.2 Historical Site Use and Facility Operations

Historical site use and facility operations are detailed for the Eastside area in the 2007 Closure Plan (BRC et al., 2007) and in other related BRC documents. As described in the Closure Plan (BRC et al., 2007) the Eastside area covers approximately 2,321 contiguous acres. The Eastside area lies to the east of Boulder Highway and to the north of Lake Mead Parkway and includes land on which:

- Unlined wastewater effluent evaporation/infiltration ponds (and associated conveyance ditches) were built and into which various plant wastewaters were discharged from 1942 through 1976.

- Effluent from the adjacent TIMET plant was disposed of through the use of a spray irrigation wheel used between 1985 and 1990.

- Lined wastewater effluent ponds were constructed, into which effluent from the TIMET plant was discharged from 1976 to 2005.

- The City of Henderson constructed municipal wastewater infiltration basins (e.g., the Southern rapid infiltration basins [RIBs]).

- Unlined wastewater effluent ponds were constructed, but were never used.

The proposed upgradient wells are generally located within those areas of the Site that were not used for the operations described above. The land in the vicinity of the upgradient wells has remained primarily open desert, with relatively minor adjacent property development for residential or commercial (non-industrial) use. Upgradient wells AA-UW-5 and AA-UW-6 are relatively close to the southern boundary of the upper ponds. Wells AA-01 and AA-UW-1 are relatively close to the now-closed TIMET ponds that were built on top of the former upper ponds. Wells AA-01, AA-UW-1, and AA-27 are adjacent to the active BMI Complex.

Appendix C provides selected information extracted from various reports and documents that summarize off-site source information for the plants area upgradient to the south and west. Included in Appendix C is a regional map from 2006 that shows flow from the plants area toward proposed upgradient wells AA-01 and AA-27. A regional map of arsenic detections in groundwater (from various dates) is also included that shows arsenic impacts originating at the plants area. Regional plume maps (2006) for nitrate, chloride, sulfate, total dissolved solids (TDS), and selected metals and volatile organic compounds (VOCs) are also included. A map and table summarizing Tronox (formerly Kerr-McGee Chemical LLC) source areas is included for reference. As discussed in Section 2.4.3, the plants area is interpreted to be the likely source for some of the groundwater impacts detected in the proposed upgradient wells.

2.3 Modeling Results

BRC submitted a draft groundwater flow model calibration report to the NDEP in 2009 (DBS&A, 2009) (subsequently approved by NDEP). An evaluation of the potential historical mounding was completed using the updated flow model. Pond recharge was estimated at 48.18 inches per year (Figure 5). Heads were simulated for this condition to produce a groundwater flow map representing the period of time that the lower ponds were in use (Figure 6). The simulation indicates that groundwater flow was oriented primarily to the north near the locations of

upgradient wells AA-01, AA-UW-1, AA-27, AA-UW-2, AA-UW-3, A-UW-4, and AA-UW-5. The simulation also indicates that localized mounding is present at the lower ponds, and flow is radial for a small area around the ponds. The location of well AA-UW-6 appears to be marginally within the area of the localized mounding.

The remaining upgradient wells are located outside the area of modeled localized mounding caused by pond use. Flow direction near the former ponds and at well AA-UW-6 has since returned to its original northwesterly direction (Figure 2, Figure C-1). As discussed in Section 2.4, the soil and groundwater data from well AA-UW-6 do not appear to reflect unique impacts due to former pond use.

2.4 Soil and Groundwater Impacts

Selected analytical data for the upgradient well locations are discussed below in Sections 2.4.1 through 2.4.3.

2.4.1 Soil Data for Metals

The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of metals concentrations data collected from the upgradient well locations (Appendix D) (excluding duplicates). The following metals from the Site-related chemicals (SRC) list were evaluated:

- Radionuclides
  - Radium-226
  - Radium-228
  - Thorium-228
  - Thorium-230
  - Thorium-232
  - Uranium-233/234
  - Uranium-235/236
  - Uranium-238

- Metals
  - Aluminum
  - Antimony
  - Arsenic
  - Barium
  - Beryllium
  - Boron
  - Cadmium
  - Calcium
  - Chromium (VI)
  - Chromium (total)
  - Cobalt
  - Copper
  - Iron
  - Lead
  - Lithium
  - Magnesium
  - Manganese
  - Mercury
  - Molybdenum
  - Nickel
  - Niobium

In accordance with the BRC Closure Plan (BRC et al., 2007), background metals comparisons were performed using the Quantile test, Slippage test, t-test, and Wilcoxon Rank Sum test with Gehan modification. The Quantile test, Slippage test, and Wilcoxon Rank Sum test are nonparametric; that is, the tests are distribution-free, and an assumption of whether the data are normally or lognormally distributed is therefore not necessary. The computer statistical software program Guided Interactive Statistical Decision Tools (GISdT) (Neptune and Company, 2007) was used to perform all statistical comparisons, with a decision error of alpha equal to 0.025.

The Wilcoxon Rank Sum test analyzes the difference between the ranks for two populations. This is a nonparametric method of assessing differences in the centers of the distributions that relies on the relative rankings of data values. Knowledge of the precise form of the population distributions is not necessary. When the data are normally distributed, the Wilcoxon Rank Sum test has less power than the two-sample t-test, but the assumptions are not as restrictive. The GISdT version of the Wilcoxon Rank Sum test uses the Mantel approach, which is equivalent to using the Gehan ranking system (Neptune and Company, 2007).

The Quantile test addresses tail effects that are not addressed in the Wilcoxon Rank-Sum test. The Quantile test looks for differences in the right tails (upper end of the dataset) rather than central tendency as the Wilcoxon Rank-Sum test does. The Quantile test was performed using a defined quantile equal to 0.80 (Neptune and Company, 2007).

The Slippage test looks for a shift to the right in the extreme right tail of the background dataset versus the extreme right tail of the site dataset. This is equivalent to asking if a set of the largest values of the site distribution are significantly larger (in a statistical sense) than the maximum value of the background distribution (Neptune and Company, 2007).

Typically, an alpha equal to 0.05 is used to evaluate a statistically significant result (Neptune and Company, 2007). Since several correlated tests were conducted, a lower alpha was selected. As more tests are performed, it is more likely that a statistically significant result will be obtained purely by chance. Given the use of multiple statistical tests, an alpha equal to 0.025 was selected according to NDEP guidance (NDEP, 2009a) as a reasonable significance level (p).

If an individual test p-value is less than 0.025, the test result is interpreted to indicate that the metal exceeds background levels. Additional factors, such as detection frequency and mean or median values, are also reviewed to determine if a metal exceeds background levels.

Metals data from the upgradient well borings and nearby soil borings SB-01 and SB-27 were sorted into the following groups based on sample depth and the geographic location of the boring:

- Shallow Qal (samples from less than 20 ft bgs): Data were compared to the Shallow McCullough dataset, the Shallow Mixed dataset, or the Shallow River dataset.

- Deep Qal (samples from greater than or equal to 20 ft bgs, but collected above the contact between the Qal and Upper Muddy Creek formation [UMCf]): Data were compared to the Deep McCullough dataset, the Deep Mixed dataset, or the Deep River dataset.

- TMC (samples collected from the UMCf (below the Qal/TMCf contact): Data were compared to TMC dataset.

The River datasets represent background metals characterized from soils collected in the shallow alluvial fan system originating in the River Mountains to the east of the Site. The McCullough datasets represent background metals characterized from soils collected in the shallow alluvial system originating in the McCullough Range to the south/southwest of the Site. The Mixed datasets represent background metals characterized from soils collected in the shallow alluvial system originating from both the River Mountains and the McCullough Range, where the two fan systems coalesce.

Data from upgradient well boring AA-UW-5 were compared to the Mixed datasets because this boring is located where the River Mountains alluvial fan system and the McCullough Range fan system coalesce. Data from upgradient well boring AA-UW-6 were compared to the River datasets because this boring is located within the River Mountains alluvial fan system. All other borings (including soil borings SB-01 and SB-27) fall within the McCullough Range fan system, so these remaining data were compared to the McCullough datasets (BRC and ERM, 2009a). Deep data below the Qal/UMCf contact were compared to the TMC dataset.

2.4.1.1 Shallow Metals (less than 20 feet below grade)

The shallow background metals comparison for upgradient well borings AA-UW-5 (Shallow Mixed dataset) and AA-UW-6 (Shallow River dataset) could not be completed because, with only two samples per boring (not a total of four in a usable set), there is an insufficient number of detections to use for the statistical calculations.

The background metals comparison for the upgradient well borings falling into the McCullough grouping (all borings except AA-UW-5 and AA-UW-6) indicates that the following metals were detected above background:

- Boron
- Chromium (VI)
- Total chromium
- Iron
- Niobium
- Silver
- Sodium
- Strontium
- Titanium
- Tungsten
- Vanadium

2.4.1.2 Deep Metals (greater than 20 feet below grade and above the Qal/UMCf contact)

The deep background metals comparison for upgradient well boring AA-UW-6 (Deep River dataset) could not be completed because, with only two samples in the boring, there is an insufficient number of detections to use for the statistical calculations.

In the absence of statistical analysis, a rudimentary comparison was made with the available data. For metals with reported detections, the mean and maximum detected concentrations in AA-UW-6 were compared to mean and maximum concentrations of the same metals in the Deep River dataset. The following metals detected in the AA-UW-6 soil samples exceed the mean background in the Deep River dataset:

- Cadmium
- Calcium
- Lithium
- Manganese
- Molybdenum

- Silicon
- Tungsten
- Uranium
- Radium-226
- Thorium-228
- Thorium-230

Thorium-230 is the only metal detected in the AA-UW-6 soil samples that had a maximum detected concentration that exceeds the maximum detected value in the Deep River dataset.

The background metals comparison for the upgradient borings falling into the Deep McCullough grouping (all borings except AA-UW-5 and AA-UW-6) indicates that the following metals were detected above background:

- Aluminum
- Barium
- Boron
- Chromium (VI)
- Total chromium
- Iron
- Lead
- Manganese
- Selenium
- Silicon
- Thallium
- Titanium
- Zinc

The background metals comparison for the upgradient well boring AA-UW-5 falling into the Mixed Deep grouping indicates that the following metals were detected above background:

- Silicon
- Sodium
- Strontium

2.4.1.3 Deep Metals (below the Qal/UMCf contact)

The background metals comparison for the upgradient boring data collected below the Qal/UMCf contact (all borings) indicates that the following metals were detected above background in the TMC dataset:

- Beryllium
- Boron
- Cadmium
- Chromium (VI)
- Total chromium
- Copper
- Magnesium
- Molybdenum
- Selenium
- Silicon
- Sodium
- Thallium
- Tungsten
- Uranium
- Zinc
- Radium-226
- Thorium-230
- Uranium-233/234
- Uranium-238

2.4.1.4 Supplemental Shallow Soil Background Dataset AA-UW-6 Comparison

The soil metals data from boring AA-UW-6 were compared also to the background metals concentrations detected in the supplemental shallow soil background dataset (ERM West, 2009). None of the metals detected in AA-UW-6 soil samples exceeded background metals concentrations detected in the supplemental shallow soil background dataset (Table 2).

While well AA-UW-6 has higher arsenic concentrations than downgradient wells, this well has lower concentrations for carbon tetrachloride, total and hexavalent chromium, manganese, PCE, perchlorate, Ra 226+228, selenium, and TTHMs. Well AA-UW-6 appears to be affected by upgradient sources of arsenic, but there does not appear to be an off-site source of these other analytes upgradient of AA-UW-6.

2.4.2 Summary of Metals Data Evaluation

The upgradient wells and well borings are located within BRC Parcels 4A and 4B. An investigation of soil conditions in these parcels was reported in 2008 and 2009 (BRC and ERM, 2008b, 2009b). As discussed in the investigation reports, based on the results of the investigations, data review, and a screening-level health risk assessment, exposure to residual levels of chemicals in soil at the property should not result in adverse health effects to any future on-site receptors (BRC and ERM, 2008b, 2009b). The NDEP agreed with this conclusion and agreed that development may proceed on the parcels without environmental restriction (NDEP, 2008, 2009b). However, NDEP's No-Further Action (NFA) determination for the parcels was restricted to the upper 10 feet of soil (in which relatively low metals concentrations had been measured), because deeper soil had not been evaluated.

While metals detections in soils deeper than 10 ft bgs may be representative of some residual impacts from past industrial site use in the area, these deeper soil metals detections that are excluded from the NFA should not prohibit the use of the proposed wells for upgradient data collection and evaluation.

In addition to the 2008 and 2009 investigations, pH was measured in soil samples from the upgradient well borings in 2004 and 2007 (BRC and ERM, 2008a; MWH, 2006). Data for pH was collected from borings AA-UW-1 through AA-UW-6 (10 to 80 ft bgs), boring SB-01 (0 to 93 ft bgs), and boring SB-27 (0 to 107 ft bgs). For all samples, the measured values for soil pH ranged from 7.6 to 9.6. These pH data indicate that soil conditions were not acidic in the upgradient well borings and that conditions favorable for metals reduction, mobilization, and leaching were not present.

As discussed in Section 2.4.5, soil metals concentrations detected above groundwater were screened against both the background metals datasets (Section 2.4.1) and the leaching-based Basic Comparison Levels (LBCLs) from NDEP (2010). Except for one detection of aluminum in boring AA-UW-5, all metals that exceed background concentrations fall below the LBCLs (Table 2). Metals concentrations that exceed LBCLs are all below background metals concentrations.

2.4.3 Soil Data for Nonmetals

The results of laboratory analyses for nonmetals in soil samples representative of borings located in the upgradient well areas were compared to the Nevada Basic Comparison Levels (BCLs). Because no comparison was being made to background concentration levels, there was no need to group the soil samples by depth, as was the case for the evaluation of metals in soil samples.

Table 3 presents a statistical summary of nonmetals detected in soil samples collected from the upgradient well borings and adjacent borings SB-01 and SB-27. Table 4 summarizes selected analyte detections for each well boring. Compounds detected in the upgradient borings include organochlorine pesticides, organophosphate pesticides, and VOCs. None of the detections, however, exceed BCLs.

Up to 2.5 milligrams per kilogram (mg/kg) perchlorate was detected at 60 ft bgs in soil boring SB-01, drilled near upgradient well AA-01 (Table 4). Perchlorate was also detected at more shallow depths in this boring. Perchlorate was also detected in groundwater samples from well AA-01 and the other upgradient wells. The detected concentrations may not be Site-related and may be due to historical perchlorate use and release at adjacent upgradient and cross-gradient facilities (such as Tronox and AMPAC).

Similarly, relatively low concentrations of VOCs (less than 60 micrograms per kilogram [μg/kg]) have been detected in soil samples from the well borings (Table 4). Tetrachloroethene (PCE) was detected up to 7.7 μg/kg in soil samples from borings completed near wells AA-01 and AA-UW-5. Trichloroethene (TCE), a degradation daughter compound of PCE, was not detected

in soil samples from the upgradient well locations. However, both PCE and TCE have been detected in the upgradient groundwater well samples.

As discussed in Section 2.3, boring AA-UW-6 appears to be marginally within the area of former localized mounding due to pond use. Shallow groundwater flow near AA-UW-6 has since returned to its original northwesterly direction. The soil data from boring AA-UW-6 do not appear to reflect unique historical impacts from former use of the upper evaporation ponds, which is consistent with the conclusion from flow modeling that former pond use did not significantly impact soil in the area.

2.4.4 Summary of Nonmetals Data Evaluation

As discussed in Section 2.4.2, the upgradient wells and well borings are located within BRC Parcels 4A and 4B. As discussed in the soil investigation reports for these parcels (BRC and ERM, 2008b, 2009b), based on the results of the investigations, data review, and a screening-level health risk assessment, exposure to residual levels of chemicals in soil at the property should not result in adverse health effects to any future on-site receptors. The NDEP agreed with this conclusion and agreed that development may proceed on the parcels without environmental restriction (NDEP, 2008, 2009b), although NDEP's "No-Further Action (NFA)" determination for the parcels was restricted to the upper 10 feet of soil, because deeper soil had not been evaluated. While the soil nonmetals detections below BCLs may potentially represent some residual impacts from past industrial use in the area, the deeper soil nonmetals detections excluded from the NFA should not prohibit the use of the proposed wells for upgradient data collection and evaluation.

2.4.5 Metals and Nonmetals Screening Against LBCLs

The maximum metals concentrations for samples that were collected above groundwater were compared to NDEP LBCLs (dilution-attenuation factor [DAF]-20) in accordance with NDEP guidance (NDEP, 2010). These data were also compared to the background metals datasets, and the data from AA-UW-6 were further compared to the supplemental shallow soil background dataset (ERM West, 2008). (All detected iron concentrations were lower than the 54,750-mg/kg NDEP residential soil BCL and were therefore not included in the comparison.)

Table 2 lists the analytes that exceeded either the associated LBCL or background concentration.

For all borings except AA-UW-5, the maximum concentration for all of the evaluated analytes was below either the background concentration or LBCL; only one aluminum detection in AA-UW-5 exceeded both. However, aluminum has not been identified as an analyte of interest (AOI) in BRC Eastside or plants area groundwater.

For the remaining data in each boring, the detected metals concentrations that exceed background fall below LBCLs, and the detected metals concentrations that exceed LBCLs (aluminum and manganese) fall below background.

Alpha-BHC, beta-BHC, and dichloromethane (one detection in AA-UW-6) are the only nonmetals in the soil data that exceed LBCLs. As shown in Appendix C, the detected alpha-BHC and manganese concentrations are likely due to the plants area alpha-BHC impacts, which are much higher in comparison. Dichloromethane has not been identified as an AOI in BRC Eastside or plants area groundwater.

2.4.6 Groundwater Data

2.4.6.1 Piper and Stiff Diagrams

Piper trilinear diagrams and Stiff polygonal diagrams of major cation and anion data from the Eastside 2009 groundwater sampling event for BRC wells are provided as Figures 7 through 10. As shown on these figures, the ion data show that the hydrogeochemical signature of groundwater in the upgradient wells is broadly consistent with other Shallow Zone wells screened in the same hydrogeologic unit. A relatively few Site wells, however, have a relatively distinct hydrogeochemical signature, such as off-site well PC-67 (relatively high sodium and chloride content) and well AA-18, where the ion content is relatively low. Appendix E presents available Shallow Zone Layer 2 data from TIMET for comparison.

An updated version of the cation-anion balance (CAB) table (with related check calculations) is provided in Appendix F. The CAB table was prepared in accordance with NDEP guidance and Standard Methods for the Examination of Water and Wastewater (Section E).

2.4.6.2 Basic Comparison Levels

All data from the groundwater samples collected from the Shallow Zone upgradient wells over the six monitoring events were compared to BCLs established by the Nevada Division of Environmental Protection (NDEP) to determine the level of chemical impact to the upgradient wells. Each of the proposed upgradient wells appear to have been impacted above the BCLs for various individual chemical constituents (Tables 5a, 5b, 6a, and 6b), including:

- 1,4-Dichlorobenzene
- Acetaldehyde
- Alpha BHC
- Arsenic
- Bromodichloromethane
- Chlorine
- Chloroform
- Chromium (VI)
- Dimethyl phosphorodithioic acid
- Fluoride
- Formaldehyde
- Iron
- Lithium
- Magnesium
- Nitrate (as N)
- Octachlorodibenzodioxin
- Perchlorate
- Phosphorus (as P)
- Tetrachloroethylene
- Thallium
- Trichloroethylene
- Uranium

Based on isoconcentration plots of chemicals presented in the monitoring reports for the six monitoring events (Appendix G), the chemical distribution data appear to indicate that chemicals

detected in wells AA-01 and AA-27 may be moving from off-site locations onto the Site. Appendix G includes isoconcentration maps using available plants area data that are split into Shallow Zone Layer 1 and Shallow Zone Layer 2.

The source of these chemicals in groundwater samples from the upgradient wells may be the historical operations in the off-site upgradient BMI Plants area. TCE was detected at less than 1 μg/L (in wells AA-01 and AA-UW-1) in the 5th round event (Table 5a), and PCE was detected at a maximum of 84 μg/L in well AA-01 in the 5th round event (Table 5a) and at 73 μg/L in the Eastside 2009 groundwater sampling event (Table 6b).

PCE and TCE are also documented to have been released at upgradient sites to the southwest (e.g., TIMET and Tronox) (Appendix C, Figures C-12 and C-13; Appendix G). The information in Appendix C represents a portion of the off-site source information that is fully detailed in the TIMET *Conceptual Site Model Report* (TIMET, 2007) and the Kerr-McGee (now Tronox) *Conceptual Site Model* report (ENSR, 2005). Figures G-3 and G-4 are isoconcentration plots of Shallow Zone groundwater arsenic data compiled from the various sources associated with the BMI Plants area, the BRC CAMU area, and the BRC Eastside. The general spatial trends of the data for the proposed upgradient wells indicate that the concentrations are greater in wells to the south of the Site and decrease with increasing distance to the north-northeast.

An exception to this spatial trend is for arsenic, where the concentration in well AA-UW-6 (102 μg/L 5th round, 161 μg/L Eastside 2009 groundwater sampling event), located to the northeast, was greater than in well AA-UW-1 (69.8 μg/L 5th round, 90.3 μg/L Eastside 2009 groundwater sampling event), located farther to the south toward the plants area. The source of this anomaly in the data spatial trend is unknown but may be attributable to the spatial variability of the natural arsenic content of geologic materials in the Site vicinity. Wells AA-UW-1, -2, -4, -5, and -6 are installed in Layer 2 of the Shallow Zone (screened in the TMCf only). Wells AA-01, AA-27, and AA-UW-3 are screened in Layer 1 (Qal only). Because the background metals concentrations vary by lithologic unit, metals concentrations detected in groundwater samples from the wells would be expected to be reflective of the well screen layer.

As with wells AA-01 and AA-27 discussed above, the distribution of the data indicate that these chemicals may be moving from off-site locations onto the Site. The source of these chemicals in groundwater may be the historical operations in the BMI plants area.

2.4.6.3 Maximum Contaminant Levels

Data for groundwater samples collected from the proposed upgradient wells over the six monitoring events were compared to federal maximum contaminant levels (MCLs) (Tables 5b and 6b) for analytes that have no BCLs. TDS, sulfate, and chloride are the primary analytes detected above secondary MCLs; aluminum, iron, and manganese were also measured over the MCL but at a much lower frequency.

TDS in monitoring wells AA-UW-4 and AA-UW-6 exceeded ten times the secondary MCL (i.e., greater than 5,000 mg/L) in the 5th round, but the Eastside 2009 groundwater sampling event data showed lower TDS concentrations (3,700 mg/L for each well). The other proposed upgradient wells also had concentrations of TDS that exceed the TDS MCL during one or more monitoring events (Tables 5b and 6b). However, TDS concentrations are broadly consistent between sampling rounds in the proposed upgradient wells (Tables 5b and 6b).

The groundwater data from well boring AA-UW-6 do not appear to reflect unique historical impacts from former pond use. As shown on Tables 6a and 6b, the detected perchlorate and chlorine concentrations are among the lowest measured. Sulfate in well AA-UW-6 is roughly average for the proposed background wells. The TDS detection in this well, however, is among the highest TDS detections in the Shallow Zone. In addition, the arsenic was detected at 102 μg/L (5th round) and 161 μg/L (Eastside 2009 groundwater sampling event), which is the highest among the upgradient wells.

3. Summary and Conclusion

Proposed upgradient wells AA-01, AA-27, and AA-UW-1 through AA-UW-6 meet the criteria listed in Section 2 for designation as Shallow Zone upgradient wells for the Eastside area. Given the locations of the Site boundaries relative to the direction of groundwater flow and the physiographic and hydrogeologic features in the Site vicinity, there appear to be no alternative locations suitable for siting of Site upgradient wells.

Existing BRC data and modeling results that characterize groundwater flow conditions, current and historical site use, soil quality, site location, and groundwater quality support the selection of these wells for use as upgradient wells.

BRC proposes to use the data from the upgradient wells, where possible, for comparison to Site impacts and off-site impacts from the plants area and AMPAC. Appropriate data will be used as a screening tool in the BRC remedial alternatives study (RAS). If a particular analyte is detected at relatively elevated concentrations in the upgradient wells, compared to background or on-site/off-site data, then that well/analyte may be excluded from further analysis if the impacts are determined to be due to past BRC Site operations. However, that same well can still be used for data comparisons and decision-making for other analytes detected at relatively low concentrations compared to background or on-site/off-site impacts.

References

Basic Remediation Company (BRC), Environmental Resources Management (ERM), and Daniel B. Stephens & Associates, Inc. (DBS&A). 2007. *Closure plan, BMI Common Areas, Clark County, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. May 2007.

Basic Remediation Company (BRC) and Environmental Resources Management (ERM. 2008a. *Data validation summary report for the upgradient well installation investigation, July-August 2007 (Dataset 47), BMI Common Areas (Eastside), Clark County, Nevada.* February 2008.

BRC and ERM. 2008b. *Technical memorandum: Data review for 2007 Parcel 4A investigation, BMI Common Areas (Eastside), Clark County, Nevada.* Revision 2. March 12, 2008.

BRC and ERM. 2009a. *2008 Deep soil background report, BMI Common Areas (Eastside), Clark County, Nevada.* October 2009.

BRC and ERM. 2009b. *Technical memorandum: Data review for the Parcel 4B investigation, BMI Common Areas (Eastside), Clark County, Nevada.* Revision 5. October 23, 2009.

Converse. 2009. Eastside water level data, BRC Common Areas, Eastside. August 2009.

Daniel B. Stephens & Associates, Inc. (DBS&A). 2009. *Updated groundwater flow model calibration, BMI Upper and Lower Ponds area.* Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. May 14, 2009.

DBS&A. 2010. *Evaluation of hydrogeologic zone connectivity through tritium and stable isotope sampling and analysis, BMI Common Areas (Eastside), Clark County, Nevada.* Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. April 21, 2010.

ENSR International (ENSR). 2005. *Conceptual site model, Kerr-McGee facility, Henderson, Nevada.* Document Number 04020-023-100. Prepared for Kerr-McGee Chemical LLC. February 2005.

ERM West, Inc. 2009. 2008 *Supplemental shallow soil background report* (rev 6). Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. September 2009.

Montgomery Watson Harza (MWH). 2006. *Data validation summary report for the 2004 hydrogeologic characterization (dataset 27), BMI Common Areas (Eastside), Clark County, Nevada.* May 2006.

MWH. 2008. *Fifth round groundwater monitoring report, April - July 2008, BMI Common Areas (Eastside), Clark County, Henderson, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. December 2008.

Neptune and Company. 2007. Guided interactive statistical decision tools (GISdT). <www.gisdt.org>.

Nevada Division of Environmental Protection (NDEP). 2008. Response to: *Technical memorandum – Data review for 2007 Parcel 4A investigation* dated March 12, 2008, and *Errata pages for Technical memorandum – Data review for 2007 Parcel 4A investigation* dated May 2, 2008, NDEP Facility ID# H-000688. May 15, 2008.

NDEP. 2009a. *Significance levels for the Gilbert toolbox of background comparison tests, BMI plant sites and common areas projects, Henderson, Nevada.* July 2009.

NDEP. 2009b. Response to: *Technical memorandum – Data review for Parcel 4B investigation* dated October 23, 2009, NDEP Facility ID# H-000688. November 12, 2009.

NDEP. 2010. *Attachment A: Further evaluation of soil leaching to groundwater.* Available at <http://ndep.nv.gov/bmi/docs/100116%20leaching_guidance.pdf> January 16, 2010.

Titanium Metals Corporation (TIMET). 2007. *Conceptual site model, Titanium Metals Corporation Facility, Henderson, Nevada.* April 25, 2007.

TIMET. 2009. TIMET water level data, 2009 routine events and recent extraction well data, January to December 2009.

Veolia. 2009. Tronox depth to water, September, October, and November 2009.

Figures

S:\Projects\BRC\ES06.0067.00_Deep_Soil_Background_Investigation\Sept06_Draft\Figures\Fig_1_Site_Loc_Topo_Map.pdf

BMI COMMON AREAS

BMI INDUSTRIAL AREA

2,000 1,000 0 2,000 Feet

Nevada-Clark Co. 7.5 Minute Series (Topographic)
Henderson, Nevada SE, Boulder City NW, and Sloan NE Quadrangles

BMI Site
Henderson, Nevada

N

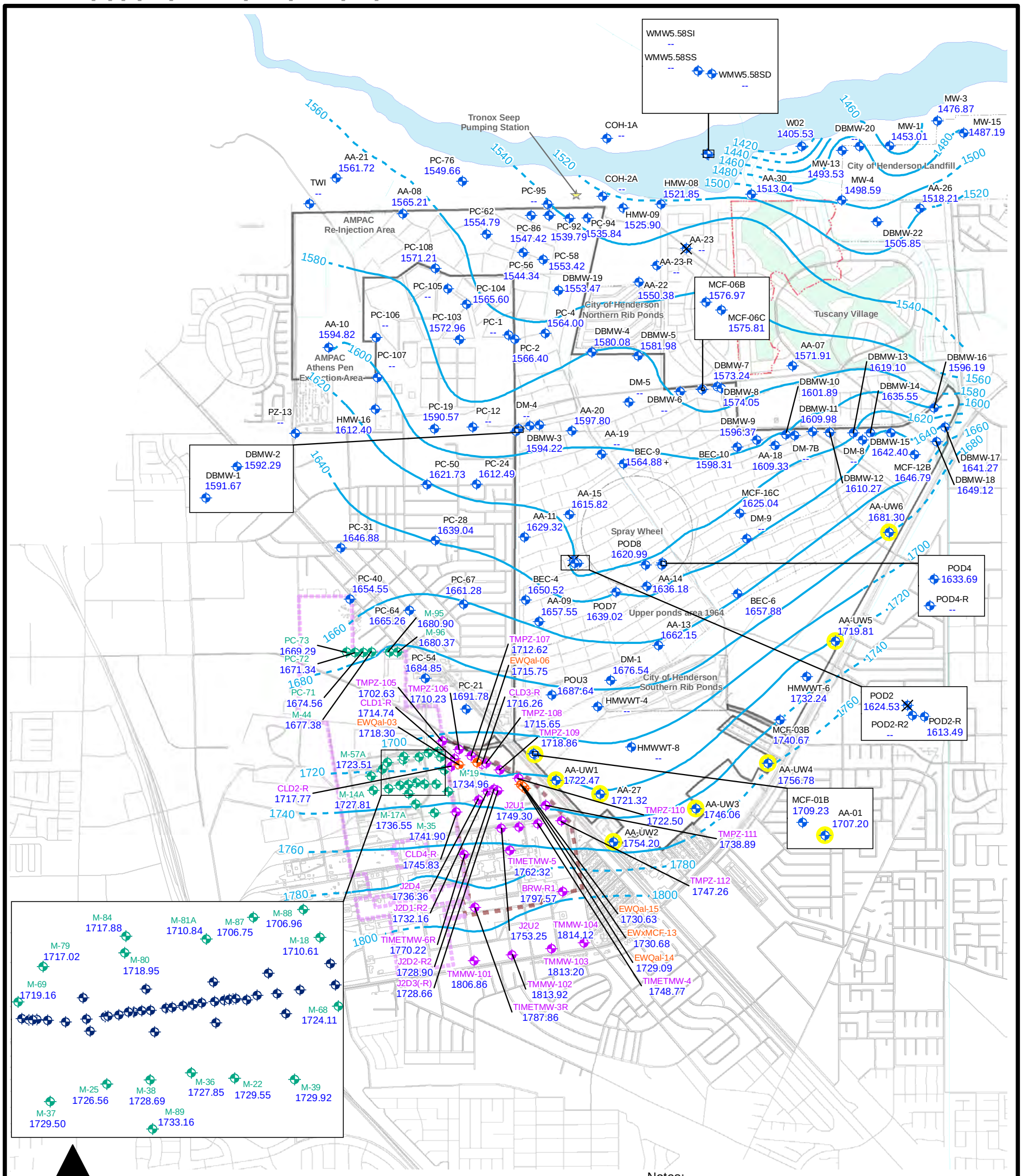
FIGURE 1

SITE LOCATION AND TOPOGRAPHIC MAP

Basic Remediation COMPANY

Prepared by:	Date	JOB No. 1881262
MKJ MWH	09/28/06	FILE: GIS/BRC/BKGD_FIGURE1.MXD

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/FLUID_LEVELS/FIG03_GROUNDWATER_SHALLOW_ZONE.MXD 011150



Notes:

1. + = Water level data from well BEC-9 have not been used for Shallow Zone flow maps in prior monitoring reports.
2. * = Groundwater elevation values near on site Tronox pumping wells in this area ranged between 1705 and 1725 feet above mean sea level during the September/ October 2009 sampling event.

Explanation

- Shallow Zone BRC monitoring well Water level data from August 2009 (Converse, 2009)
- Shallow Zone BRC monitoring well (abandoned) Water level data from August 2009 (Converse, 2009)
- Shallow Zone TIMET monitoring well Water level data from July 2009 (Timet, 2009)
- Shallow Zone TIMET extraction well Water level data from December 2009 (Timet, 2009)
- Shallow Zone Tronox monitoring well Water level data from September and October 2009 (Veolia, 2009)
- Shallow Zone Tronox monitoring well Water level data from September and October 2009 (Veolia, 2009) *
- Proposed upgradient wells
- MCF-06B 1576.97 Monitoring well designation Static water elevation (ft msl)
- Streets
- Potentiometric surface (dashed where inferred)
- Site boundary
- Las Vegas Wash
- TIMET site boundary (See Appendix C for off-site source information)
- Tronox site boundary (See Appendix C for off-site source information)
- Gravel pit circa 1976 Source: Aerial photograph dated 1976

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 2
Shallow Zone
Groundwater Elevations 2009

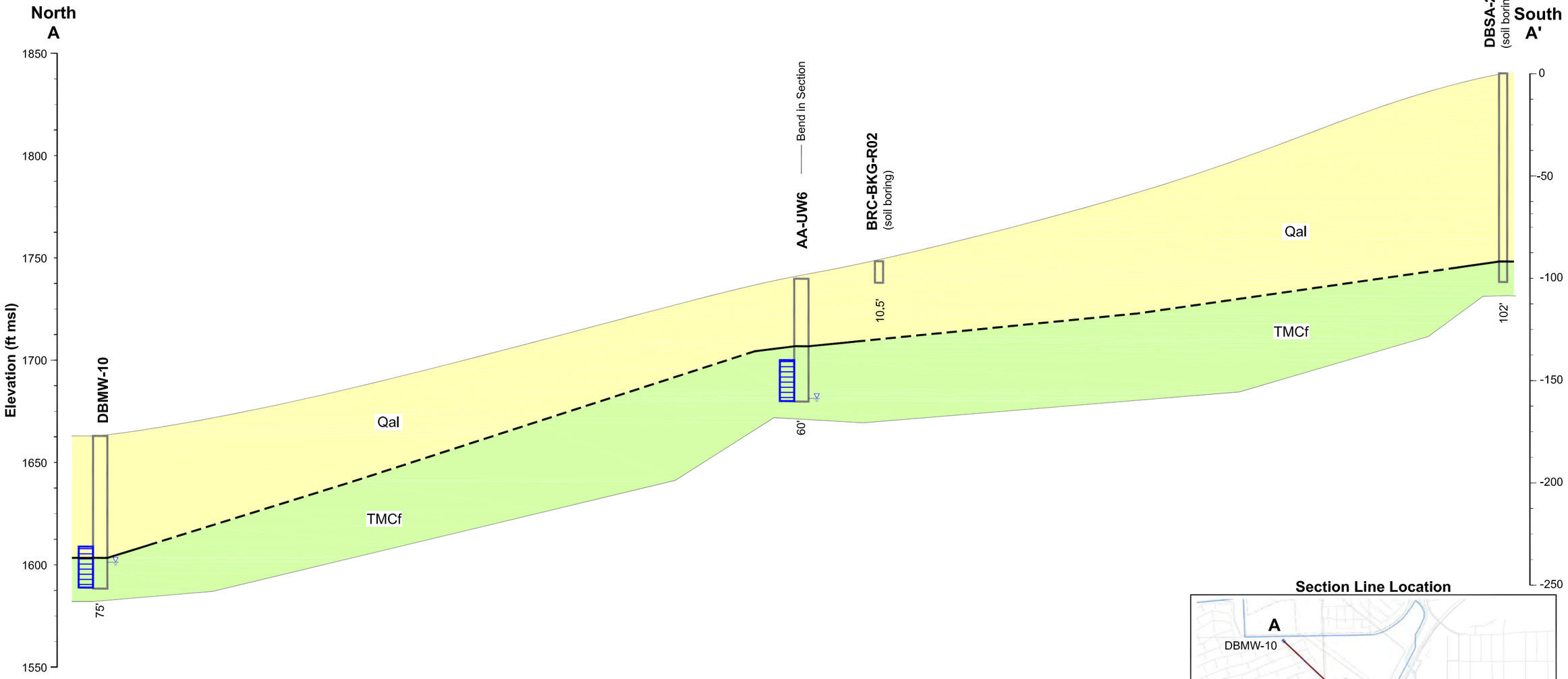
Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by: DBS&A CRS

Date 02-09-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/BASE_MAPS/MASTER_SITE_MAP_ALL_MONITORING_WELLS_S.MXD 909011



Vertical Scale: 1" = 50'
Horizontal Scale: 1" = 500'
Vertical exaggeration = 10x

0 500 ft

Explanation

- Well
- Water level August 2009
- Well screen interval
- Contact between Qal and TMCf

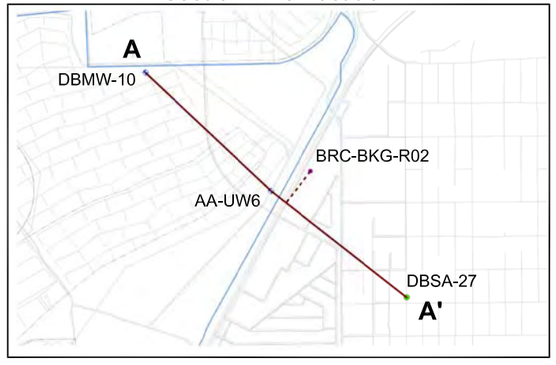
DBMW-10 — Well Designation

75' — Well or Boring; Total Depth

Notes:

Qal = Quaternary Alluvium (Qal)
TMCf= Tertiary Muddy Creek Formation
msl = Mean sea level

Section Line Location



BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 3
CROSS SECTION
A-A'

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A CRS
Date 05-14-10

S:\Projects\BRC\ES09.0281_BRC_WH_and_Pre-CSM_Tasks\VR_Drawings\ES09_281_03CS_cross_section_AAbend.dwg

S:\Projects\BRC\ES09.0281_BRC_WH_and_Pre-CSM_Tasks\VR_Drawings\ES09_281_03CS_cross_section_A-B.dwg

South B

North B'

Plants Area (recharge area)

BRC Eastside (pressure area)

TR-07 (1069ft)

M-50 (1203ft)

M-31A (943ft)

TIMET MW-05 (693ft)

AA-UW-01 (431ft)

MCF-01A (388ft)

MCF-01B (393ft)

AA-01 (383ft)

Elevation (ft msl)

1950
1850
1800
1750
1700
1650
1600

Qal

TMCf

292'

60'

55'

65'

65'

92'

359.5'

400'

0
-50
-100
-150

Feet Below Grade

Vertical Scale: 1" = 50'
Horizontal Scale: 1" = 500'
Vertical exaggeration = 10x

0 500 ft

Explanation

- Well
- Water level July 2009
- Water level June 2009
- Water level May 2009
- Well screen interval
- Contact between Qal and TMCf

TR-07 (1069ft) — Well Designation

Projection Distance

Well

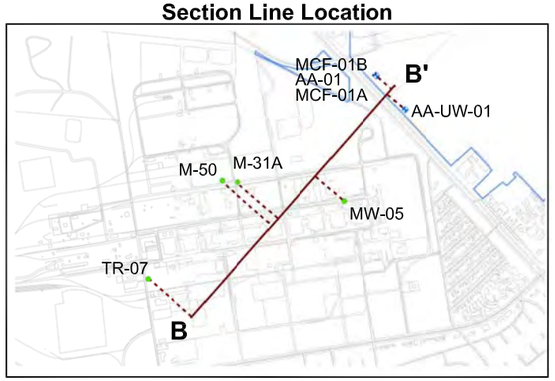
Break in Scale

292' — Total Depth

Notes:

Qal = Quaternary Alluvium (Qal)
TMCf= Tertiary Muddy Creek Formation
msl = Mean sea level

Section Line Location



BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 4
CROSS SECTION
B-B'

DBS&A

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

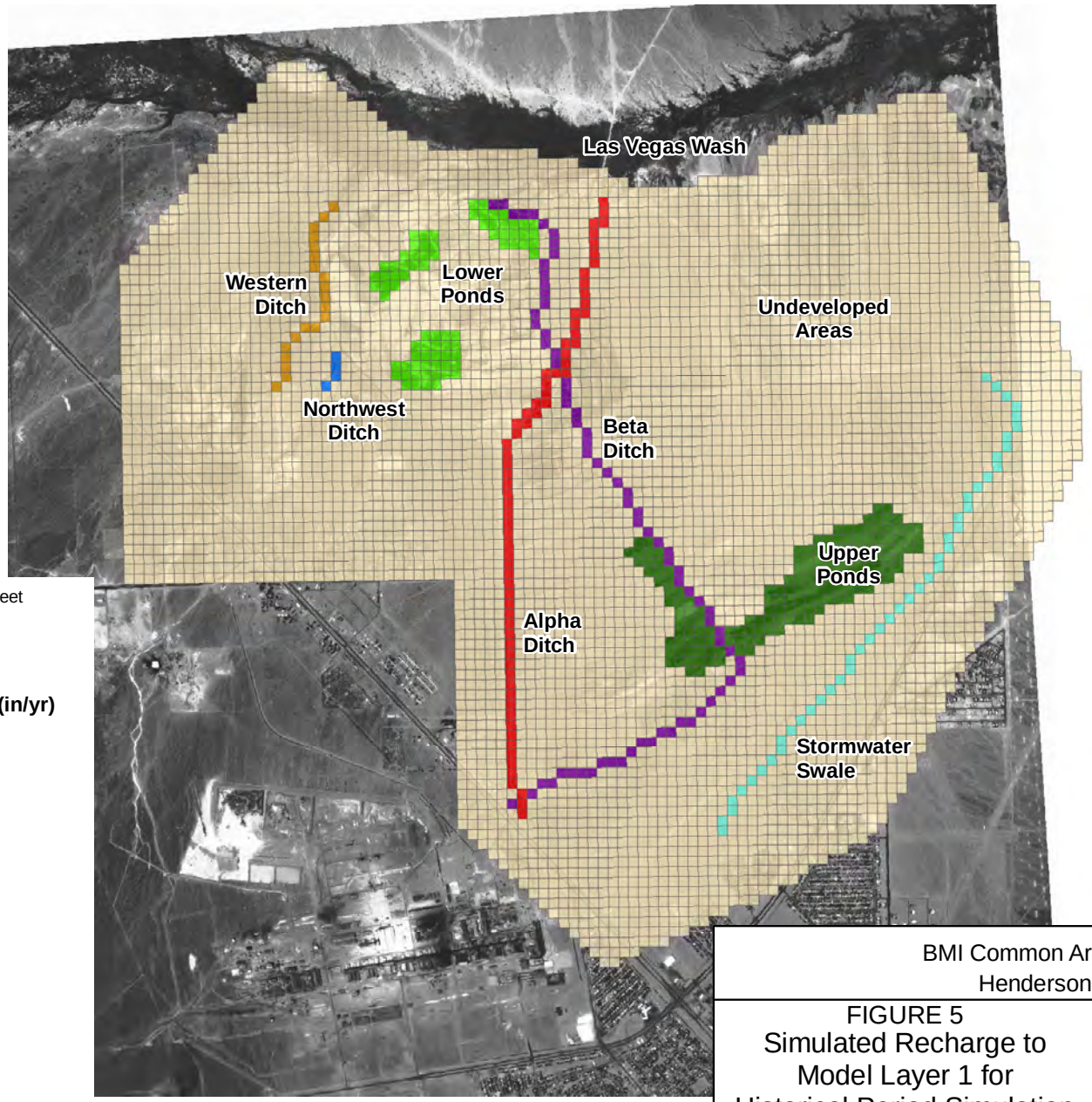
Prepared by: CRS

Date 05-10-10

S:\Projects\BRC\ES09.0281_BRC_WH_and_Pre-CSM_Tasks\VR_Drawings\ES09_281_03CS_cross_section_AAbend.dwg

S:\Projects\BRC\ES09.0281_BRC_WH_and_Pre-CSM_Tasks\VR_Drawings\ES09_281_05KB_cross_section_C-D.dwg

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/REPORTS/FIG05_SIM_RECHARGE_MODEL_LAYER_1_HIST_PERIOD_SIM.MXD 014150



N

0 1,750 3,500 Feet

Explanation

Historical recharge (in/yr)

- 0.394
- 13.97
- 14.45
- 21.9
- 41.96
- 48.18
- 87.6
- 105.1
- Model grid

Source: Aerial photograph, 1968

BMI Common Areas (Eastside)
Henderson, Nevada

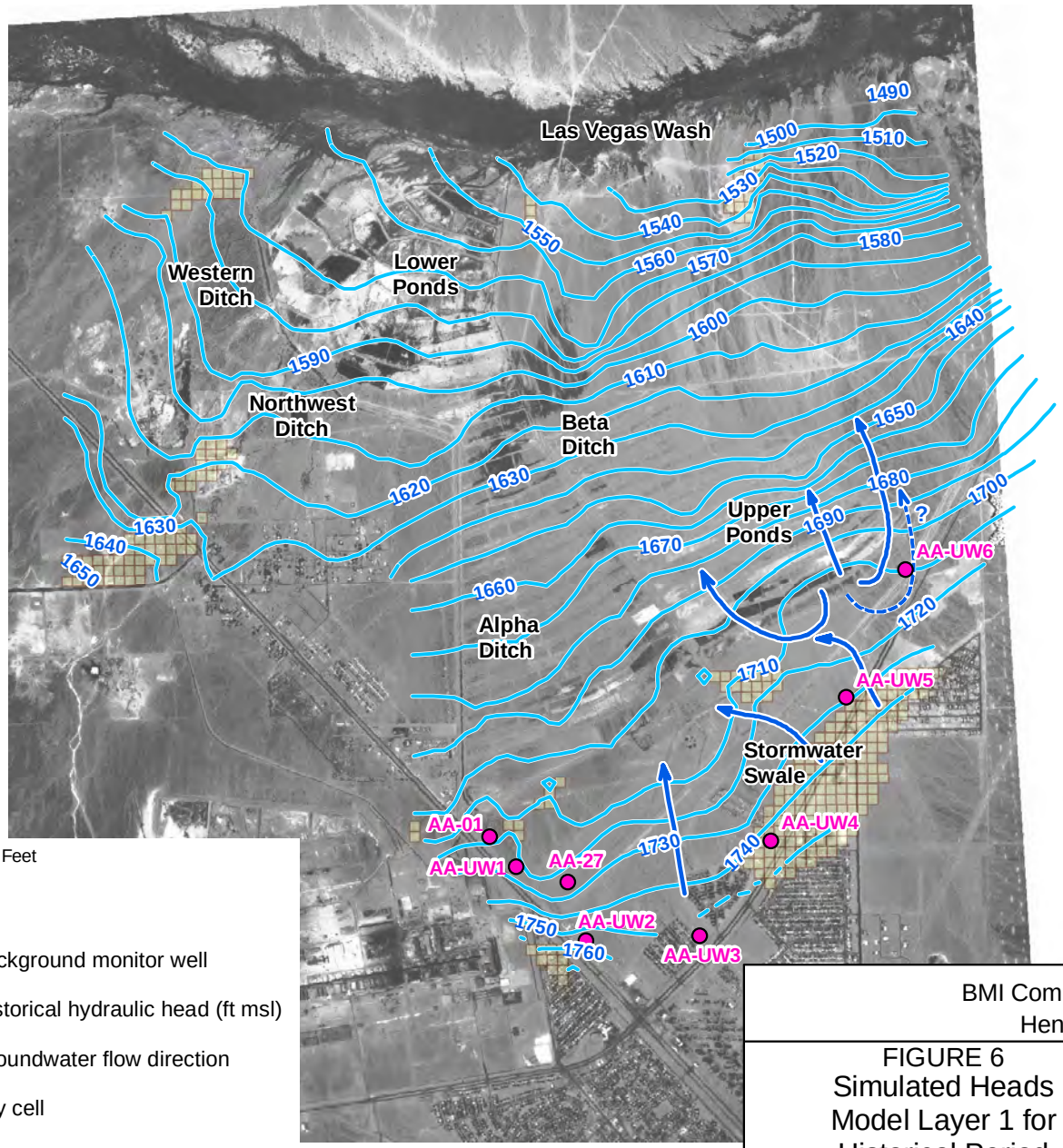
FIGURE 5
Simulated Recharge to Model Layer 1 for Historical Period Simulation

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by:	Date	
DBS&A CRS	02-23-10	S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/Mg_2009_DEEP.MXD 906121

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/REPORTS/FIG06_HISTORICAL_HEADS_MODEL_LAYER_1.MXD 014150



N

0 1,750 3,500 Feet

Explanation

- Proposed background monitor well
- Simulated historical hydraulic head (ft msl)
- Simulated groundwater flow direction
- Simulated dry cell

Source: Aerial photograph, 1968

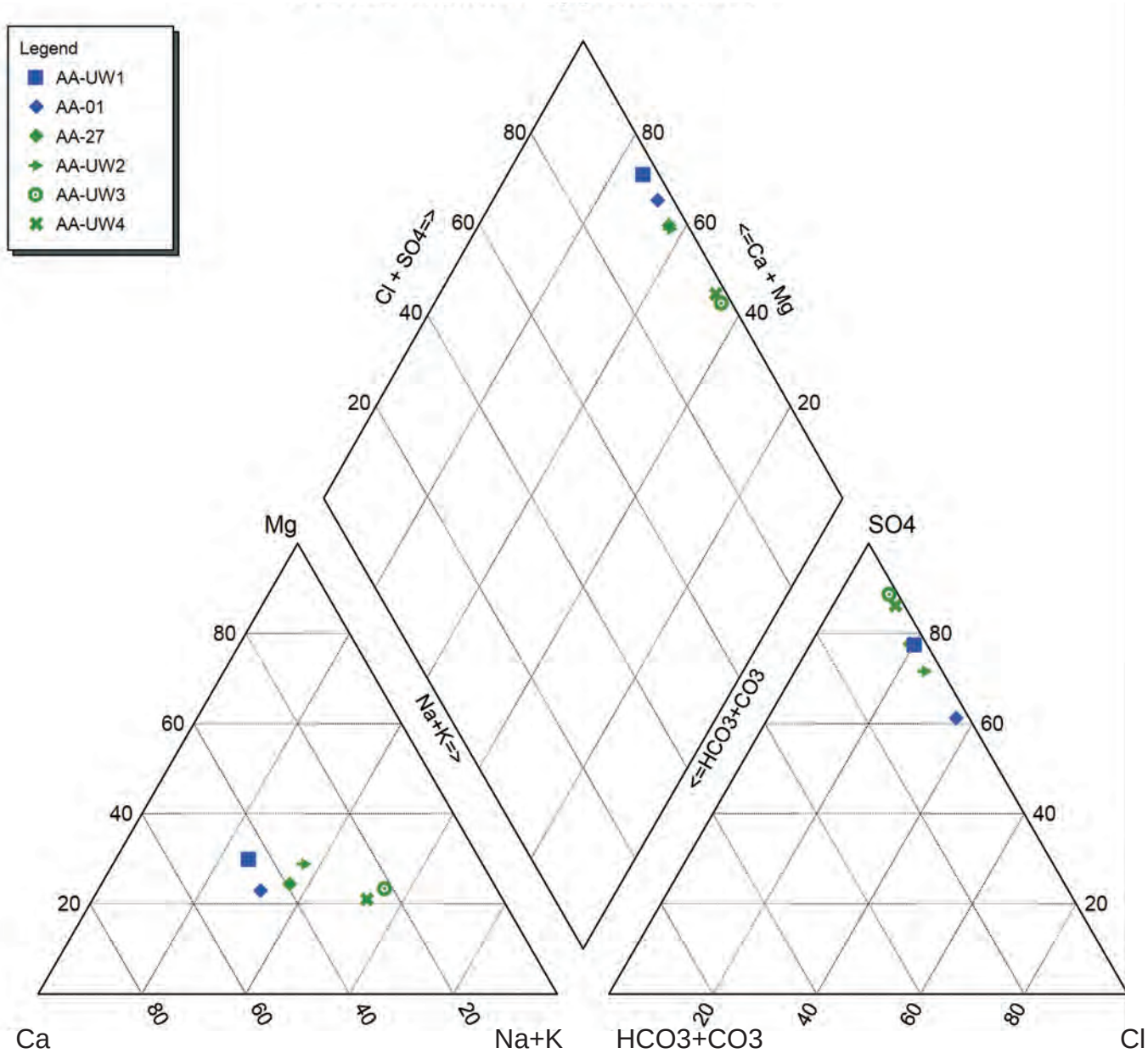
BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 6
Simulated Heads
Model Layer 1 for
Historical Period

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by:	Date	
DBS&A CRS	02-23-10	S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/Mg_2009_DEEP.MXD 906121



Note: Data from 2009 sampling event.

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 7
Piper Trilinear Diagrams
Upgradient Wells

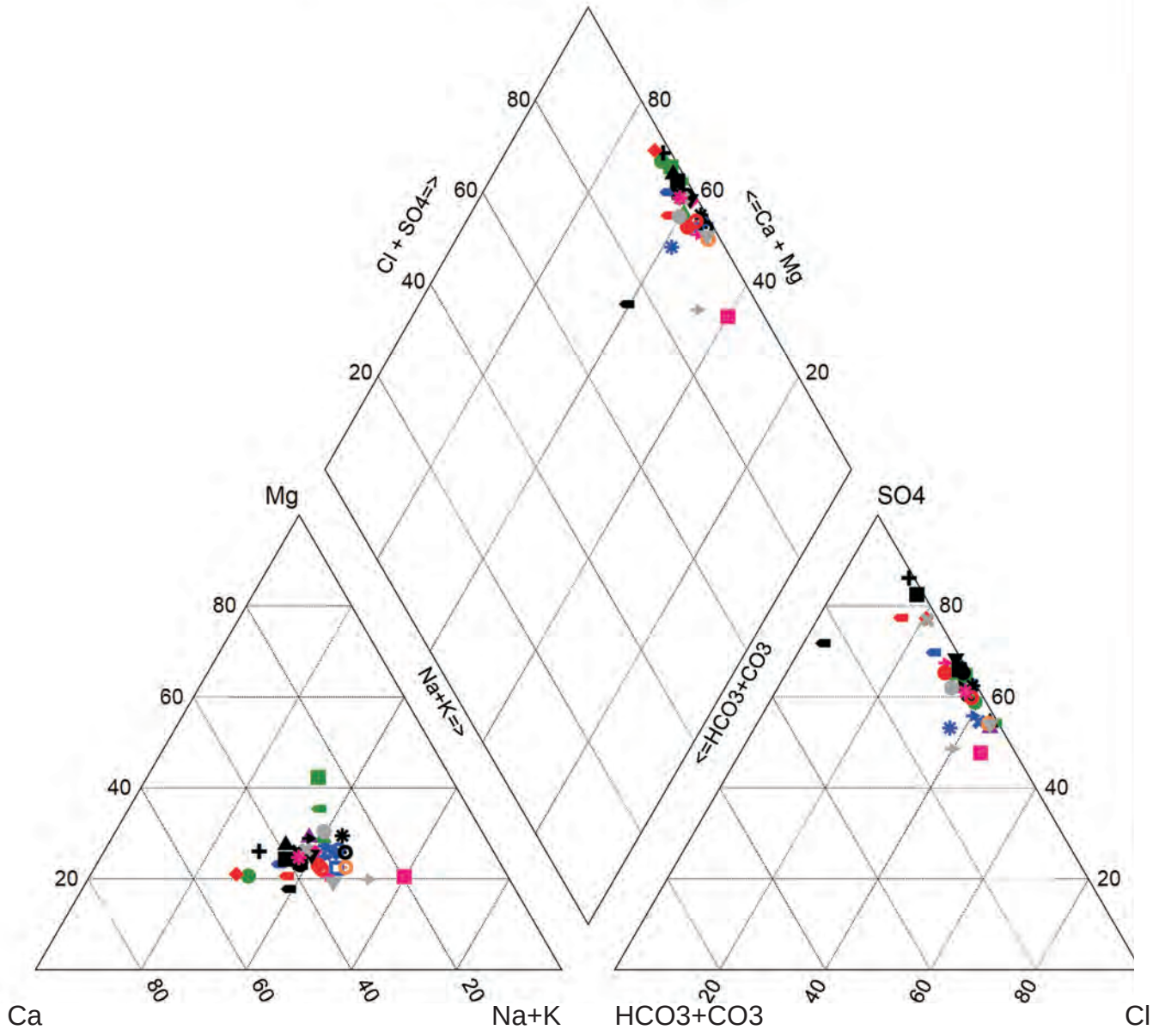
Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by: DBS&A CRS

Date 04-08-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/VRDRAWINGS/Fig_1_location_map.cdr



Note: Data from 2009 sampling event.

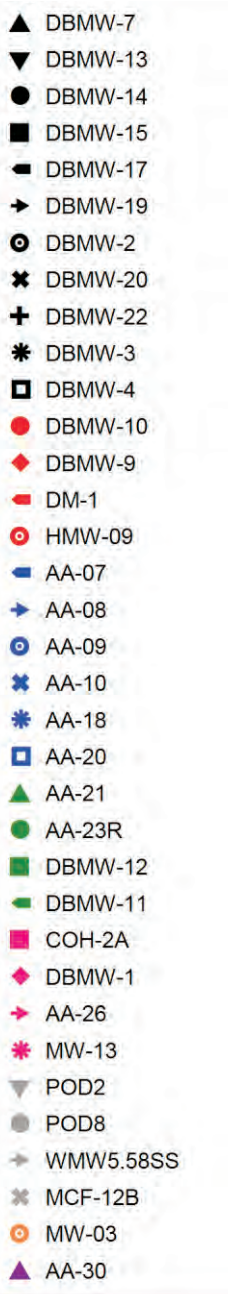
BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 8
Piper Trilinear Diagrams
Selected Shallow Zone Wells
Page 1 of 2

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by:	Date	
DBS&A CRS	04-08-10	S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/VRDRAWINGS/Fig_1_location_map.cdr



Note: Data from 2009 sampling event.

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 8
Piper Trilinear Diagrams
Selected Shallow Zone Wells
Page 2 of 2 (Legend)

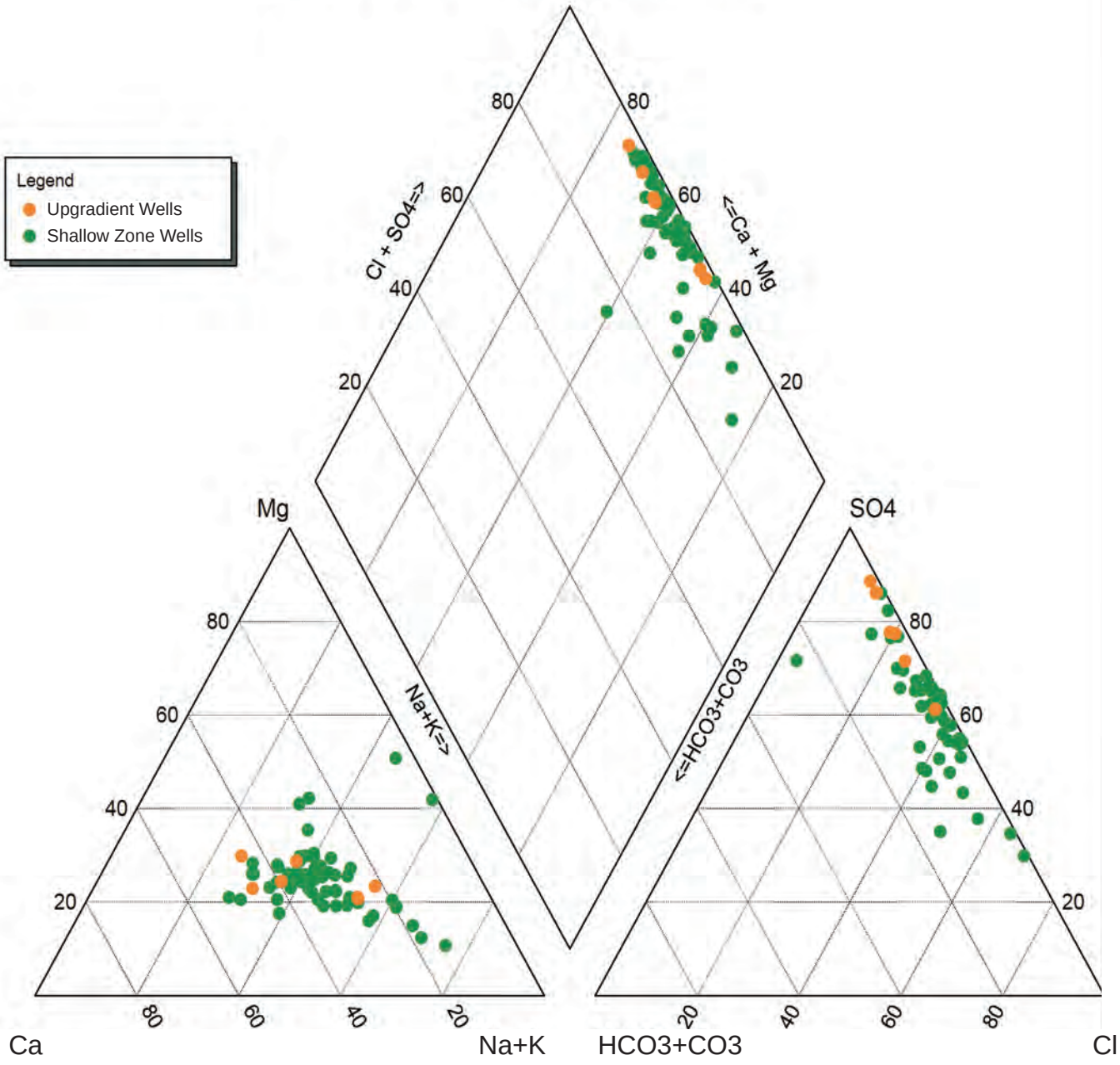
Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by: DBS&A CRS

Date 04-08-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/VRDRAWINGS/Fig_1_location_map.cdr



Note: Data from 2009 sampling event.

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 9
Piper Trilinear Diagrams
Upgradient Wells and
Selected Shallow Zone Wells

Daniel B. Stephens & Associates, Inc.

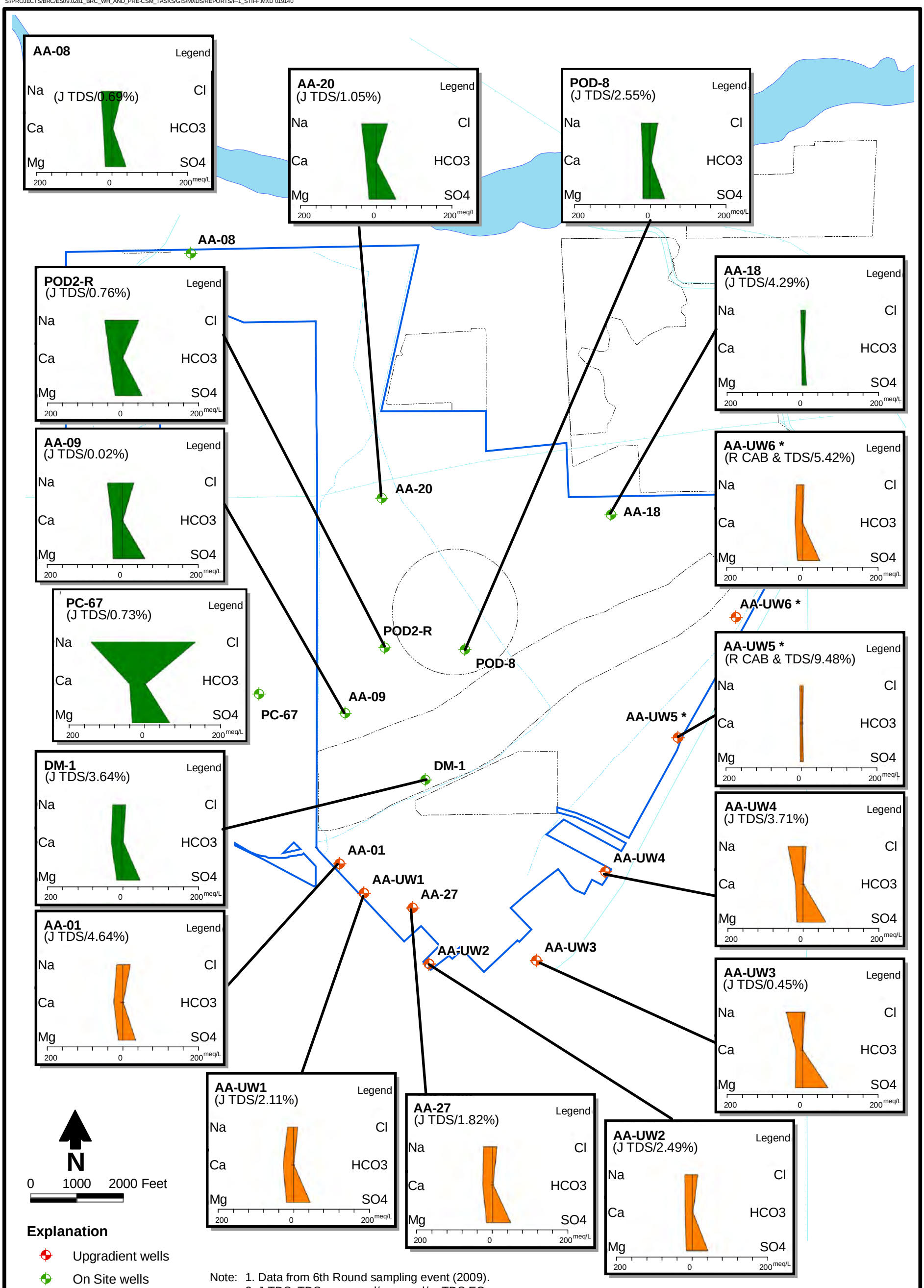
Basic Remediation COMPANY

Prepared by: DBS&A CRS

Date 04-08-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/VRDRAWINGS/Fig_1_location_map.cdr

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/REPORTS/F-1_STIFF.MXD 019140



Note:
1. Data from 6th Round sampling event (2009).
2. J-TDS: TDS measured/sum and/or TDS:EC ratio checks do not pass; Cation-anion balance check does pass
3. * = R-CAB&TDS: Cation-anion balance check does not pass; TDS measured/sum and/or TDS:EC ratio check do not pass

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE 10
Stiff Polygonal Diagrams
Upgradient Wells and Selected On Site (Shallow Zone) Wells

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by:	Date
DBS&A CRS	04-13-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/REPORTS/STIFF.MXD 907121

Tables

Table 1. Summary of Well Construction Data
Upgradient Wells

Well ID	Top of Casing Elevation (ft msl)	Surface Elevation (ft msl)	Total Boring Depth (ft bgs)	Casing Material	Diameter of Casing (inches)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Screen Interval (feet)	Screen Slot Size (inches)	Well Installation Date	Water-Bearing Zone	Date Measured	Measured Depth to Water (ft btoc)	Groundwater Elevation (ft msl)
AA-01	1757.13	1754.93	401	Sch 80 PVC	4	29	49	20	0.01	02/25/04	Shallow	04/08/04	45.10	1712.03
												04/18/06	44.78	1712.35
												07/27/06	45.44	1711.69
												10/16/06	45.63	1711.50
												01/22/07	45.68	1711.45
												06/03/08	47.07	1710.06
AA-27	1789.43	1787.03	143	Sch 80 PVC	4	61.5	81.5	20	0.01	07/07/04	Shallow	07/13/04	59.45	1729.98
												04/19/06	65.85	1723.58
												07/26/06	66.77	1722.66
												10/16/06	66.82	1722.61
												01/22/07	66.97	1722.46
												06/03/08	67.69	1721.74
AA-UW1	1774.45	1771.22	69.4	Sch 40 PVC	4	54.5	64.5	10	0.02	07/30/07	Shallow	06/03/08	52.35	1722.10
AA-UW2	1821.36	1817.63	82.72	Sch 40 PVC	4	55	75	20	0.02	08/03/07	Shallow	06/03/08	66.83	1754.53
AA-UW3	1812.72	1809.07	88.53	Sch 40 PVC	4	60	80	20	0.02	08/06/07	Shallow	06/03/08	66.66	1746.06
AA-UW4	1800.28	1796.79	60.7	Sch 40 PVC	4	35	55	20	0.02	08/07/07	Shallow	06/05/08	42.86	1757.42
AA-UW5	1768.68	1765.05	63.62	Sch 40 PVC	4	37	57	20	0.02	08/08/07	Shallow	06/05/08	48.80	1719.88
AA-UW6	1740.81	1737.01	68.66	Sch 40 PVC	4	37	57	20	0.02	08/08/07	Shallow	06/05/08	58.94	1681.87

ft msl = Feet above mean sea level
ft bgs = Feet below ground surface
ft btoc = Feet below top of casing

Table 2. Summary of Screening against Background Metals Concentrations and Leaching-Based Basic Comparison Levels
Page 1 of 4

Analyte	Number of Samples [a]	Number of Sample Exceedances	
		Background Metals Concentrations [b]	LBCLs (DAF20)
AA-1			
alpha-BHC	3	NA	3
Aluminum	4	—	4
Antimony	4	3	—
Beryllium	4	1	—
beta-BHC	4	NA	4
Boron	4	1	—
Chromium (total)	4	4	—
Copper	4	4	—
Manganese	4	—	4
Selenium	4	1	—
Silver	4	3	—
Sodium	4	1	—
Thallium	2	1	—
Titanium	4	4	—
Vanadium	4	3	—
Zinc	4	1	—
AA-27			
alpha-BHC	3	NA	3
Aluminum	6	—	6
Antimony	5	2	—
Beryllium	6	1	—
beta-BHC	2	NA	2
Calcium	6	1	—
Manganese	6	—	6
Titanium	6	6	—
Tungsten	6	3	—
Vanadium	6	1	—
Zinc	6	2	—

[a] All samples were collected from above the water table.

[b] The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of soil metals concentrations data collected from the upgradient well locations (Appendix D and Table 3) (excluding duplicates).

LBCL = Leaching-based Basic Comparison Level
DAF = Dilution-attenuation factor
NA = Background metal screening not applicable to nonmetals.
— = No exceedances detected in any of the samples.

Table 2. Summary of Screening against Background Metals Concentrations and Leaching-Based Basic Comparison Levels
Page 2 of 4

Analyte	Number of Samples [a]	Number of Sample Exceedances	
		Background Metals Concentrations [b]	LBCLs (DAF20)
AA-UW-1			
Aluminum	6	—	6
Beryllium	6	2	—
beta-BHC	1	NA	1
Magnesium	6	—	6
Niobium	1	1	—
Silver	6	3	—
Titanium	6	6	—
Tungsten	6	3	—
Zinc	6	2	—
AA-UW-2			
Aluminum	8	—	8
Lithium	3	1	—
Manganese	8	—	8
Silver	8	2	—
Titanium	8	6	—
Vanadium	8	1	—
Zinc	8	1	—
AA-UW-3			
Aluminum	8	—	8
Beryllium	8	2	—
Manganese	8	—	8
Silver	8	2	—
Thorium-232	8	1	—
Titanium	8	7	—
Tungsten	1	1	—
Zinc	8	3	—
AA-UW-4			
Aluminum	5	—	5
Barium	5	1	—

[a] All samples were collected from above the water table.

[b] The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of soil metals concentrations data collected from the upgradient well locations (Appendix D and Table 3) (excluding duplicates).

LBCL = Leaching-based Basic Comparison Level
DAF = Dilution-attenuation factor
NA = Background metal screening not applicable to nonmetals.
— = No exceedances detected in any of the samples.

Table 2. Summary of Screening against Background Metals Concentrations and Leaching-Based Basic Comparison Levels
Page 3 of 4

Analyte	Number of Samples [a]	Number of Sample Exceedances	
		Background Metals Concentrations [b]	LBCLs (DAF20)
AA-UW-4 (cont.)			
Chromium (VI)	1	1	—
Manganese	5	—	5
Niobium	1	1	—
Silicon	5	1	—
Silver	5	2	—
Tungsten	4	2	—
AA-UW-5			
Aluminum	6	1	6
Barium	6	1	—
Lithium	6	1	—
Manganese	6	—	6
Radium-226	6	1	—
Silicon	6	5	—
Silver	6	2	—
Sodium	6	4	—
Strontium	6	3	—
Thorium-232	6	2	—
Titanium	6	2	—
Tungsten	1	1	—
Vanadium	6	1	—
AA-UW-6 (blue text indicates comparison against shallow supplemental background dataset [ERM West, 2009])			
Aluminum	6	2 — —	6
Cadmium	6	2 2 —	—
Calcium	6	2 2 —	—
Dichloromethane	4	0 NA —	1
Magnesium	6	2 2 —	2
Manganese	6	2 — —	6
Molybdenum	6	2 2 —	—

[a] All samples were collected from above the water table.

[b] The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of soil metals concentrations data collected from the upgradient well locations (Appendix D and Table 3) (excluding duplicates).

LBCL = Leaching-based Basic Comparison Level
DAF = Dilution-attenuation factor
NA = Background metal screening not applicable to nonmetals.
— = No exceedances detected in any of the samples.

Table 2. Summary of Screening against Background Metals Concentrations and Leaching-Based Basic Comparison Levels
Page 4 of 4

Analyte	Number of Samples [a]		Number of Sample Exceedances		
			Background Metals Concentrations [b]		LBCLs (DAF20)
AA-UW-6 (blue text indicates comparison against shallow supplemental background dataset [ERM West, 2009])(cont.)					
Radium-226	5	2	2	—	—
Silicon	6	2	1	—	—
Thorium-230	6	2	3	—	—
Uranium	6	2	2	—	—
Uranium-233/234	6	2	2	—	—
Uranium-235/236	2	0	1	—	—
Uranium-238	6	2	2	—	—

[a] All samples were collected from above the water table.

[b] The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of soil metals concentrations data collected from the upgradient well locations (Appendix D and Table 3) (excluding duplicates).

LBCL = Leaching-based Basic Comparison Level
DAF = Dilution-attenuation factor
NA = Background metal screening not applicable to nonmetals.
— = No exceedances detected in any of the samples.

Table 3. Statistical Summary of Soil Analytical Results for Nonmetals Detected in Upgradient Well Borings

Parameter of Interest	Compound List	Total No. of Samples	No. of Detections	Detection Frequency (%)	Detected Concentration (mg/kg)		Residential Soil BCL	No. of Detections > BCL
					Minimum	Maximum		
Aldehydes	Formaldehyde	14	6	43	0.081	0.15	10.6	0
Dioxins/Furans	TCDD TEQ	11	11	100	0.14	8	50[a]	0
General Chemistry	Cyanide (total)	26	1	4	1.9	1.9	1,220	0
	Sulfide	26	1	4	12.9	12.9	—	—
	Chlorate	29	2	7	1.5	1.8	—	—
	Bromide	29	4	14	0.91	1.3	—	—
	Orthophosphate as P	29	4	14	0.89	3.2	—	—
	Bromine	14	2	14	2	2.6	—	—
	Nitrite (as N)	29	6	21	0.25	3.6	—	—
	Total Kjeldahl nitrogen (TKN)	26	11	42	23.5	104	—	—
	Perchlorate	69	43	62	0.0052	2.5	54.8	0
	Fluoride	29	21	72	0.44	7.1	3,670	0
	Nitrate (as N)	29	26	90	0.27	6	—	—
	Chloride	29	29	100	2.4	367	—	—
	Chlorine	14	14	100	12.2	734	7,820	0
	Sulfate	29	29	100	15.2	2330	—	—
OCPs	4,4-DDD	55	4	7	0.0019	0.0032	2.44	0
	4,4-DDE	55	4	7	0.0021	0.0033	1.72	0
	4,4-DDT	55	5	9	0.0065	0.012	1.72	0
	alpha-BHC	55	6	11	0.0054	0.022	0.0902	0

[a] ATSDR screening value of 50 parts per trillion (ppt)

mg/kg = Milligrams per kilogram
BCL = Basic comparison level (From NDEP 2008; values used are residential soil BCLs).
— = Not applicable or no value has been established
OCPs = Organochlorine pesticides

Table 3. Statistical Summary of Soil Analytical Results for Nonmetals Detected in Upgradient Well Borings

Parameter of Interest	Compound List	Total No. of Samples	No. of Detections	Detection Frequency (%)	Detected Concentration (mg/kg)		Residential Soil BCL	No. of Detections > BCL
					Minimum	Maximum		
OCPs (continued)	beta-BHC	55	6	11	0.0022	0.034	0.316	0
	Lindane	55	6	11	0.004	0.0096	0.437	0
	Methoxychlor	55	6	11	0.036	0.11	306	0
OPPs	Disulfoton	14	1	7	0.004	0.004	2.44	0
	Chlorpyrifos	13	1	8	0.0042	0.0042	183	0
	Malathion	13	1	8	0.0053	0.0053	1,220	0
	Dichlorvos	13	2	15	0.0074	0.0074	1.68	0
	Ethoprophos	13	2	15	0.005	0.0057	—	—
	Phorate	13	2	15	0.0046	0.0049	—	—
	Ronnel	13	2	15	0.0033	0.0037	3,060	0
	Sulfotep	13	2	15	0.0041	0.0051	—	—
SVOCs	bis(2-Ethylhexyl) phthalate	50	1	2	1.7	1.7	34.7	0
VOCs	Chloroform	16	1	6	0.0013	0.0013	0.245	0
	m,p-Xylene	18	2	11	0.0011	0.0025	195	0
	o-Xylene	18	2	11	0.00058	0.0011	282	0
	Xylenes (total)	18	2	11	0.0017	0.0036	193	0
	Toluene	29	4	14	0.00043	0.0011	521	0
	1,2,4-Trimethylbenzene	27	4	15	0.00046	0.00073	8.94	0
	Ethylbenzene	19	3	16	0.00025	0.0008	234	0
	Methyl ethyl ketone	16	4	25	0.0071	0.013	22,600	0

mg/kg = Milligrams per kilogram
BCL = Basic comparison level (From NDEP 2008; values used are residential soil BCLs.
— = Not applicable or no value has been established

OCPs = Organochlorine pesticides
OPPs = Organophosphorous pesticides
SVOCs = Semivolatile organic compounds
VOCs = Volatile organic compounds

Table 3. Statistical Summary of Soil Analytical Results for Nonmetals Detected in Upgradient Well Borings
Page 3 of 3

Parameter of Interest	Compound List	Total No. of Samples	No. of Detections	Detection Frequency (%)	Detected Concentration (mg/kg)		Residential Soil BCL	No. of Detections > BCL
					Minimum	Maximum		
VOCs (continued)	Acetonitrile	21	6	29	0.0067	0.013	623	0
	Tetrachloroethylene	18	8	44	0.00023	0.0077	0.554	0
	Acetone	26	12	46	0.0052	0.058	14,200	0
	Benzene	16	8	50	0.00049	0.0011	0.656	0
	Dichloromethane	34	25	74	0.0027	0.045	8.9	0

mg/kg = Milligrams per kilogram
BCL = Basic comparison level (From NDEP 2008; values used are residential soil BCLs.
— = Not applicable or no value has been established
VOCs = Volatile organic compounds

Table 4. Summary of Selected Nonmetals Detected in Soil from Upgradient Well Borings

Analyte	Boring	Date	Depth (feet)	Concentration (mg/kg)
1,2,4-Trimethylbenzene	AA-UW-4	08/06/2007	10	0.00046
	AA-UW-4	08/06/2007	20	0.0005
	AA-UW-4	08/06/2007	40	0.00073
	SB-01-B	05/10/2004	7	0.00072
4,4-DDD	SB-01-B	05/10/2004	0	0.0032
	SB-01-B	05/10/2004	7	0.0023
	SB-27-A	06/24/2004	0	0.0031
	SB-27-A	06/24/2004	7	0.0019
4,4-DDE	AA-UW-1	07/30/2007	0	0.0026
	SB-01-B	05/10/2004	0	0.0021
	SB-01-B	05/10/2004	7	0.0024
	SB-27-A	06/24/2004	0	0.0033
4,4-DDT	SB-01-B	05/10/2004	0	0.009
	SB-01-B	05/10/2004	7	0.0092
	SB-27-A	06/24/2004	0	0.012
	SB-27-A	06/24/2004	7	0.0094
	SB-27-A	06/29/2004	107	0.0065
Acetone	AA-UW-1	07/30/2007	5	0.0068
	AA-UW-1	07/30/2007	10	0.0066
	AA-UW-1	07/30/2007	50	0.014
	AA-UW-1	07/30/2007	60	0.028
	AA-UW-4	08/06/2007	20	0.0052
	AA-UW-4	08/06/2007	30	0.0059
	AA-UW-4	08/06/2007	40	0.0053
	AA-UW-6	08/07/2007	10	0.014
	AA-UW-6	08/07/2007	40	0.0055
	SB-01-B	05/10/2004	0	0.033
	SB-01-B	05/10/2004	7	0.058
	SB-27-A	06/24/2004	0	0.054
alpha-BHC	SB-01-B	05/10/2004	0	0.022
	SB-01-B	05/10/2004	0	0.021
	SB-01-B	05/10/2004	7	0.013
	SB-01-B	05/11/2004	93	0.0054
	SB-27-A	06/24/2004	0	0.02
	SB-27-A	06/24/2004	0	0.02

mg/kg = Milligrams per kilogram

Table 4. Summary of Selected Nonmetals Detected in Soil from Upgradient Well Borings
Page 2 of 5

Analyte	Boring	Date	Depth (feet)	Concentration (mg/kg)
alpha-BHC (continued)	SB-27-A	06/24/2004	7	0.011
	SB-27-A	06/29/2004	107	0.0066
beta-BHC	AA-UW-1	07/30/2007	0	0.0065
	SB-01-B	05/10/2004	0	0.034
	SB-01-B	05/10/2004	0	0.03
	SB-01-B	05/10/2004	7	0.012
	SB-01-B	05/10/2004	17	0.0025
	SB-27-A	06/24/2004	0	0.0052
	SB-27-A	06/24/2004	7	0.0022
Lindane	SB-01-B	05/10/2004	0	0.0091
	SB-01-B	05/10/2004	7	0.0057
	SB-01-B	05/11/2004	93	0.004
	SB-27-A	06/24/2004	0	0.0096
	SB-27-A	06/24/2004	7	0.0052
	SB-27-A	06/29/2004	107	0.0048
Ethylbenzene	AA-UW-2	07/31/2007	10	0.00025
	AA-UW-3	08/05/2007	30	0.00028
	AA-UW-4	08/06/2007	5	0.00054
	AA-UW-4	08/06/2007	40	0.0008
Nitrate (as N)	AA-UW-1	07/30/2007	10	6
	AA-UW-1	07/30/2007	10	4.8
	AA-UW-1	07/30/2007	30	1.6
	AA-UW-1	07/30/2007	40	1.4
	AA-UW-1	07/30/2007	50	0.83
	AA-UW-1	07/30/2007	60	0.27
	AA-UW-2	07/31/2007	10	1.6
	AA-UW-2	07/31/2007	70	2.2
	AA-UW-3	08/05/2007	10	8.5
	AA-UW-3	08/05/2007	80	1.4
	AA-UW-4	08/06/2007	10	0.6
	AA-UW-4	08/06/2007	50	2.7
	AA-UW-5	08/07/2007	10	2
	AA-UW-5	08/07/2007	60	2.6
	AA-UW-6	08/07/2007	10	2
	AA-UW-6	08/07/2007	50	0.39

mg/kg = Milligrams per kilogram

Table 4. Summary of Selected Nonmetals Detected in Soil from Upgradient Well Borings
Page 3 of 5

Analyte	Boring	Date	Depth (feet)	Concentration (mg/kg)
Nitrate (as N) (continued)	SB-01-B	05/10/2004	0	3.2
	SB-01-B	05/10/2004	7	3.6
	SB-01-B	05/10/2004	17	1.9
	SB-01-B	05/10/2004	27	0.54
	SB-01-B	05/10/2004	47	0.52
	SB-01-B	05/11/2004	77	0.64
	SB-01-B	05/11/2004	93	1.5
	SB-27-A	06/24/2004	7	0.88
	SB-27-A	06/24/2004	27	0.82
	SB-27-A	06/24/2004	57	0.87
	SB-27-A	06/29/2004	97	3.3
	SB-27-A	06/29/2004	107	2.4
Perchlorate	AA-UW-1	07/30/2007	5	0.272
	AA-UW-1	07/30/2007	10	1.55
	AA-UW-1	07/30/2007	10	1.41
	AA-UW-1	07/30/2007	30	0.0449
	AA-UW-1	07/30/2007	40	0.0447
	AA-UW-1	07/30/2007	50	0.0716
	AA-UW-1	07/30/2007	60	0.1
	AA-UW-2	07/31/2007	5	0.0742
	AA-UW-2	07/31/2007	10	0.142
	AA-UW-3	08/05/2007	5	1.2
	AA-UW-3	08/05/2007	30	0.0072
	AA-UW-3	08/05/2007	60	0.0038
	AA-UW-3	08/05/2007	70	0.0105
	AA-UW-4	08/06/2007	5	0.0349
	AA-UW-4	08/06/2007	10	0.0078
	AA-UW-4	08/06/2007	30	0.0077
	AA-UW-4	08/06/2007	40	0.0162
	AA-UW-5	08/07/2007	5	0.222
	AA-UW-6	08/07/2007	5	0.284
	AA-UW-6	08/07/2007	10	0.0117
	AA-UW-6	08/07/2007	20	0.138
	AA-UW-6	08/07/2007	40	0.162
	AA-UW-6	08/07/2007	40	0.107

mg/kg = Milligrams per kilogram

Table 4. Summary of Selected Nonmetals Detected in Soil from Upgradient Well Borings
Page 4 of 5

Analyte	Boring	Date	Depth (feet)	Concentration (mg/kg)
Perchlorate (continued)	SB-01-B	05/10/2004	0	1.99
	SB-01-B	05/10/2004	7	0.19
	SB-01-B	05/10/2004	27	0.0052
	SB-01-B	05/10/2004	47	0.0088
	SB-01-B	05/12/2004	60	2.5
	SB-01-B	05/11/2004	77	0.0482
	SB-01-B	05/11/2004	80	0.17
	SB-01-B	05/11/2004	93	0.0249
	SB-01-B	05/11/2004	120	0.1
	SB-01-B	05/12/2004	180	0.095
	SB-01-B	05/12/2004	214	0.017
	SB-27-A	06/24/2004	0	0.295
	SB-27-A	06/24/2004	7	0.117
	SB-27-A	06/24/2004	17	0.132
	SB-27-A	06/24/2004	27	0.0892
	SB-27-A	06/24/2004	47	0.0487
	SB-27-A	06/24/2004	57	0.046
	SB-27-A	06/29/2004	77	0.0505
	SB-27-A	06/29/2004	97	0.106
	SB-27-A	06/29/2004	102	0.0611
	SB-27-A	06/29/2004	107	0.103
	SB-27-B	07/07/2004	120	0.0308
	SB-27-B	07/07/2004	125	0.0294
	SB-27-B	07/07/2004	131	0.0064
Sulfate	AA-UW-1	07/30/2007	10	725
	AA-UW-1	07/30/2007	10	511
	AA-UW-1	07/30/2007	30	62
	AA-UW-1	07/30/2007	40	69.6
	AA-UW-1	07/30/2007	50	754
	AA-UW-1	07/30/2007	60	271
	AA-UW-2	07/31/2007	10	197
	AA-UW-2	07/31/2007	70	424
	AA-UW-3	08/05/2007	10	216
	AA-UW-3	08/05/2007	80	589
	AA-UW-4	08/06/2007	10	24.4

mg/kg = Milligrams per kilogram

Table 4. Summary of Selected Nonmetals Detected in Soil from Upgradient Well Borings
Page 5 of 5

Analyte	Boring	Date	Depth (feet)	Concentration (mg/kg)
Sulfate (continued)	AA-UW-4	08/06/2007	50	746
	AA-UW-5	08/07/2007	10	15.2
	AA-UW-5	08/07/2007	60	89.3
	AA-UW-6	08/07/2007	10	23.7
	AA-UW-6	08/07/2007	50	567
	SB-01-B	05/10/2004	0	19.6
	SB-01-B	05/10/2004	7	54.9
	SB-01-B	05/10/2004	17	191
	SB-01-B	05/10/2004	27	59
	SB-01-B	05/10/2004	47	142
	SB-01-B	05/11/2004	77	408
	SB-01-B	05/11/2004	93	133
	SB-27-A	06/24/2004	0	69.4
	SB-27-A	06/24/2004	7	2330
	SB-27-A	06/24/2004	17	311
	SB-27-A	06/24/2004	27	308
	SB-27-A	06/24/2004	47	137
	SB-27-A	06/24/2004	57	241
	SB-27-A	06/29/2004	97	898
	SB-27-A	06/29/2004	107	856
Tetrachloroethylene	AA-UW-1	07/30/2007	50	0.0018
	AA-UW-1	07/30/2007	60	0.00068
	SB-01-B	05/10/2004	0	0.00029
	SB-01-B	05/10/2004	7	0.00027
	SB-01-B	05/10/2004	27	0.00023
	SB-01-B	05/10/2004	47	0.00068
	SB-01-B	05/11/2004	77	0.0077
	SB-01-B	05/11/2004	93	0.00043

mg/kg = Milligrams per kilogram

Table 5a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
First through Fifth Sampling Rounds

Well	Analyte	Method	Unit	Event	Result	Nevada BCL
AA-01	Arsenic	SW6020	µg/L	1st	67.3	0.0448
				2nd	66.3	0.0448
				3rd	68.8	0.0448
				4th	78.3	0.0448
	Tetrachloroethylene	SW8260	µg/L	1st	81	0.105
				2nd	45	0.105
				3rd	42	0.105
				4th	84	0.105
				5th	54	0.105
	Octachlorodibenzodioxin	SW8290	pg/L	1st	49	0.448
	Phosphorus (as P)	SW6020	µg/L	2nd	100	0.73
	Chlorine	EPA 300.0	mg/L	1st	1780	3.65
				2nd	1700	3.65
				3rd	1510	3.65
				4th	1940	3.65
				5th	1420	3.65
	Trichloroethylene	SW8260	µg/L	1st	0.34	0.028
				2nd	0.29	0.028
				3rd	0.46	0.028
				4th	0.44	0.028
				5th	0.41	0.028
	Chloroform	SW8260	µg/L	1st	4	0.167
				2nd	3.2	0.167
				3rd	7.9	0.167
				4th	5.5	0.167
				5th	5	0.167
	Acetaldehyde	EPA 8315A	µg/L	2nd	30	1.75
	Perchlorate	EPA314.0	µg/L	1st	1170	18
				2nd	1530	18
				3rd	1550	18
				4th	1290	18
	Bromodichloromethane	SW8260	µg/L	3rd	0.21	0.181
	Fluoride	EPA 300	mg/L	2nd	3.5	2.19
				3rd	3.1	2.19

BCL = Basic Comparison Level
µg/L = Micrograms per liter
pg/L = Pictograms per liter
mg/L= Milligrams per liter

Table 5a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
First through Fifth Sampling Rounds

Well	Analyte	Method	Unit	Event	Result	Nevada BCL
AA-01 (continued)	Thallium	SW6020	µg/L	2nd	10	2.56
	Dimethyl phosphorodithioic acid	Alpha Acids	mg/L	2nd	13	3.65
	Nitrate (as N)	EPA 300	mg/L	1st	11.8	10
				2nd	12.4	10
				4th	20.7	11
AA-27	Arsenic	SW6020	µg/L	1st	38.7	0.0448
				2nd	35	0.0448
	Chlorine	EPA 300.0	mg/L	1st	886	3.65
				2nd	2500	3.65
				3rd	868	3.65
				4th	1210	3.65
				5th	900	3.65
	Chloroform	SW8260	µg/L	2nd	1.8	0.167
				3rd	2	0.167
				4th	1.7	0.167
	Formaldehyde	EPA 8315A	µg/L	2nd	60	1.46
	Acetaldehyde	EPA 8315A	µg/L	2nd	30	1.75
	Perchlorate	EPA 314.0	µg/L	1st	247	18
				2nd	246	18
				3rd	261	18
				4th	249	18
				5th	266	18
	Chloroform	SW8260	µg/L	1st	1.6	0.167
				5th	1.4	0.167
	Acetaldehyde	EPA 8315A	µg/L	1st	3.8	1.75
	Fluoride	EPA 300	mg/L	2nd	3.3	2.19
				3rd	3	2.19
	Dimethyl phosphorodithioic acid	Alpha Acids	mg/L	2nd	6.7	3.65
	Nitrate (as N)	EPA 300	mg/L	1st	14.1	10
				2nd	39.3	10
				3rd	12	10
				4th	12.6	12
	Chromium (VI)	SM3500-CR D	µg/L	2nd	260	110

BCL = Basic Comparison Level
µg/L = Micrograms per liter
pg/L = Pictograms per liter
mg/L= Milligrams per liter

Table 5a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
First through Fifth Sampling Rounds
Page 3 of 3

Well	Analyte	Method	Unit	Event	Result	Nevada BCL
AA-UW1	Arsenic	SW6020	µg/L	5th	69.8	0.0448
	Tetrachloroethylene	SW8260	µg/L	5th	24	0.105
	Chlorine	EPA 300.0	mg/L	5th	877	3.65
	Perchlorate	EPA 314.0	µg/L	5th	697	18
	Trichloroethylene	SW8260	µg/L	5th	0.26	0.028
	Chloroform	SW8260	µg/L	5th	1.1	0.167
	1,4-Dichlorobenzene	SW8260	µg/L	5th	0.58	0.467
AA-UW2	Chlorine	EPA 300.0	mg/L	5th	1040	3.65
	Chloroform	SW8260	µg/L	5th	1.2	0.167
	1,4-Dichlorobenzene	SW8260	µg/L	5th	1.1	0.467
	Perchlorate	EPA 314.0	µg/L	5th	108	18
	Iron	SW6020	µg/L	5th	793	110
AA-UW3	Chlorine	EPA 300.0	mg/L	5th	528	3.65
	Chloroform	SW8260	µg/L	5th	3.6	0.167
	Perchlorate	EPA 314.0	µg/L	5th	80.2	18
AA-UW4	Chlorine	EPA 300.0	mg/L	5th	663	3.65
	Chloroform	SW8260	µg/L	5th	2.6	0.167
	Perchlorate	EPA 314.0	µg/L	5th	90	18
AA-UW5	Chloroform	SW8260	µg/L	5th	1.9	0.167
	Chlorine	EPA 300.0	mg/L	5th	353	3.65
	Tetrachloroethylene	SW8260	µg/L	5th	0.45	0.105
	Perchlorate	EPA 314.0	µg/L	5th	57.2	18
AA-UW6	Arsenic	SW6020	µg/L	5th	102	0.0448
	Chlorine	EPA 300.0	mg/L	5th	452	3.65
	Chloroform	SW8260	µg/L	5th	0.44	0.167
	Perchlorate	EPA 314.0	µg/L	5th	65.1	18

BCL = Basic Comparison Level
µg/L = Micrograms per liter
pg/L = Pictograms per liter
mg/L= Milligrams per liter

Table 5b. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding U.S. EPA Maximum Contaminant Levels
First through Fifth Sampling Rounds
Page 1 of 2

Well	Analyte	Method	Unit	Event	Result	Secondary MCL [a]
AA-01	Chloride	EPA 300	mg/L	1st	892	250
				2nd	884	250
				3rd	757	250
				4th	970	250
				5th	711	250
	Sulfate	EPA 300	mg/L	1st	1,500	250
				2nd	1,700	250
				3rd	1,600	250
				4th	2,140	250
				5th	1,460	250
	Total Dissolved Solids	EPA 160.1	mg/L	1st	3,430	500
				2nd	3,930	500
				3rd	3,310	500
				4th	3,730	500
				5th	3,850	500
AA-27	Chloride	EPA 300	mg/L	1st	443	250
				2nd	1,250	250
				3rd	434	250
				4th	605	250
				5th	450	250
	Sulfate	EPA 300	mg/L	1st	2,410	250
				2nd	6,870	250
				3rd	2,700	250
				4th	2,800	250
				5th	2,380	250
	Total Dissolved Solids	EPA 160.1	mg/L	1st	4,080	500
				2nd	4,240	500
				3rd	4,220	500
				4th	4,340	500
				5th	4,570	500
AA-UW1	Aluminum	SW6020	µg/L	5th	323	200
	Chloride	EPA 300	mg/L	5th	439	250
	Manganese	SW6020	µg/L	5th	99	50
	Sulfate	EPA 300	mg/L	5th	2,120	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	4,310	500

[a] Parameters for which Nevada Basic Comparison Levels are not established were compared to U.S. EPA MCLs
MCL = Maximum contaminant level mg/L= Milligrams per liter µg/L = Micrograms per liter

Table 5b. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding U.S. EPA Maximum Contaminant Levels
First through Fifth Sampling Rounds
Page 2 of 2

Well	Analyte	Method	Unit	Event	Result	Secondary MCL [a]
AA-UW2	Chloride	EPA 300	mg/L	5th	522	250
	Iron	SW6020	µg/L	5th	793	300
	Manganese	SW6020	µg/L	5th	164	50
	Sulfate	EPA 300	mg/L	5th	1,930	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	4,460	500
AA-UW3	Chloride	EPA 300	mg/L	5th	264	250
	Sulfate	EPA 300	mg/L	5th	3,070	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	4,880	500
AA-UW4	Chloride	EPA 300	mg/L	5th	331	250
	Sulfate	EPA 300	mg/L	5th	2,970	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	5,990	500
AA-UW5	Sulfate	EPA 300	mg/L	5th	271	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	1,400	500
AA-UW6	Sulfate	EPA 300	mg/L	5th	2,480	250
	Total Dissolved Solids	EPA 160.1	mg/L	5th	5,850	500

[a] Parameters for which Nevada Basic Comparison Levels are not established were compared to U.S. EPA MCLs
MCL = Maximum contaminant level mg/L= Milligrams per liter µg/L = Micrograms per liter

Table 6a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
Eastside 2009 Groundwater Sampling Event

Well	Filtered?	Analyte	Unit	Result	SQL	Nevada BCL
AA-01	Yes	Chlorine	mg/L	1,520	—	4
		Perchlorate	µg/L	1,900	2	18
	No	Arsenic	µg/L	91	0.21	10
		Chlorine	mg/L	1,440	—	4
		Chloroform	µg/L	5.7	0.067	1.6
		Nitrate	mg/L	10.9	2.5	10
		Perchlorate	µg/L	1,900	2	18
		Tetrachloroethene	µg/L	73	0.065	5
		Uranium	µg/L	48.1	0.02	30
AA-27	Yes	Chlorine	mg/L	834	—	4
		Nitrate	mg/L	12.2	0.1	10
		Perchlorate	µg/L	230	2	18
	No	Arsenic	µg/L	44.3	2.1	10
		Chlorine	mg/L	845	—	4
		Nitrate	mg/L	12.5	0.1	10
		Perchlorate	µg/L	230	0.4	18
		Uranium	µg/L	68.7	0.2	30
AA-UW1	Yes	Chlorine	mg/L	824	—	4
		Magnesium	µg/L	227,000	53.5	207,000
		Perchlorate	µg/L	740	10	18
	No	alpha-BHC	µg/L	0.16	0.01	0.011
		Arsenic	µg/L	90.3	2.1	10
		Chlorine	mg/L	831	—	4
		Lithium	µg/L	180	13	73
		Magnesium	µg/L	219,000	53.5	207,000
		Perchlorate	µg/L	630	10	18
		Tetrachloroethene	µg/L	53	0.065	5
		Uranium	µg/L	48.2	0.2	30
AA-UW2	Yes	Chlorine	mg/L	999	—	4
		Nitrate	mg/L	10.2	0.1	10
		Perchlorate	µg/L	99	1	18
	No	Arsenic	µg/L	37.1	0.21	10
		Chlorine	mg/L	1,020	—	4

SQL = Sample quantitation limit
BCL = Basic Comparison Level
mg/L= Milligrams per liter
— = Not applicable or not reported
µg/L = Micrograms per liter

Table 6a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
Eastside 2009 Groundwater Sampling Event

Well	Filtered?	Analyte	Unit	Result	SQL	Nevada BCL
AA-UW2 (continued)	No	Nitrate	mg/L	10.2	0.1	10
	No	Perchlorate	µg/L	99	1	18
	No	Uranium	µg/L	98.8	0.02	30
AA-UW3	Yes	Chlorine	mg/L	506	—	4
		Magnesium	µg/L	228,000	53.5	207,000
		Perchlorate	µg/L	68	0.4	18
	No	Arsenic	µg/L	13.3	2.1	10
		Chlorine	mg/L	533	—	4
		Chloroform	µg/L	2.4	0.067	1.6
		Lithium	µg/L	132	13	73
		Magnesium	µg/L	221,000	53.5	207,000
		Perchlorate	µg/L	65	0.4	18
AA-UW4	Yes	Chlorine	mg/L	610	—	4
		Nitrate	mg/L	12.7	0.1	10
		Perchlorate	µg/L	76	0.2	18
	No	Arsenic	µg/L	94.6	2.1	10
		Chlorine	mg/L	613	—	4
		Chloroform	µg/L	2.7	0.067	1.6
		Nitrate	mg/L	12.7	0.1	10
		Perchlorate	µg/L	75	0.2	18
	Yes	Chlorine	mg/L	614	—	4
		Nitrate	mg/L	12.6	0.1	10
		Perchlorate	µg/L	81	0.2	18
	No	Arsenic	µg/L	90.4	2.1	10
		Chlorine	mg/L	608	—	4
		Chloroform	µg/L	2.5	0.067	1.6
		Nitrate	mg/L	12.6	0.1	10
		Perchlorate	µg/L	77	0.4	18
AA-UW5	Yes	Chlorine	mg/L	318	—	4
		Nitrate	mg/L	13.7	0.5	10
		Perchlorate	µg/L	54	0.4	18
	No	Arsenic	µg/L	13.4	2.1	10
		Chlorine	mg/L	333	—	4

SQL = Sample quantitation limit
BCL = Basic Comparison Level
mg/L= Milligrams per liter
— = Not applicable or not reported
µg/L = Micrograms per liter

Table 6a. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding Nevada Basic Comparison Levels
Eastside 2009 Groundwater Sampling Event
Page 3 of 3

Well	Filtered?	Analyte	Unit	Result	SQL	Nevada BCL
AA-UW5 (continued)	No	Lithium	µg/L	108	13	73
		Nitrate	mg/L	12.9	0.5	10
		Perchlorate	µg/L	56	0.4	18
	Yes	Chlorine	mg/L	324	—	4
		Nitrate	mg/L	13.3	0.5	10
		Perchlorate	µg/L	54	0.4	18
	No	Arsenic	µg/L	13.7	2.1	10
		Chlorine	mg/L	320	—	4
		Lithium	µg/L	102	13	73
		Nitrate	mg/L	13.3	0.5	10
		Perchlorate	µg/L	51	0.1	18
AA-UW6	Yes	Chlorine	mg/L	400	—	4
		Perchlorate	µg/L	52	0.4	18
	No	Arsenic	µg/L	161	2.1	10
		Chlorine	mg/L	403	—	4
		Lithium	µg/L	266	13	73
		Perchlorate	µg/L	50	0.4	18

SQL = Sample quantitation limit
BCL = Basic Comparison Level
mg/L= Milligrams per liter
— = Not applicable or not reported
µg/L = Micrograms per liter

Table 6b. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding U.S. EPA Maximum Contaminant Levels
Eastside 2009 Groundwater Sampling Event

Well	Filtered?	Analyte	Unit	Result	SQL	Secondary MCL [a]
AA-01	Yes	Chloride	mg/L	759	10	250
		Sulfate	mg/L	1,720	25	250
	No	Chloride	mg/L	719	10	250
		Iron	µg/L	1,700	4.8	300
		Sulfate	mg/L	1,640	25	250
		Total Dissolved Solids	mg/L	3,800	350	500
AA-27	Yes	Chloride	mg/L	417	10	250
		Sulfate	mg/L	2,290	25	250
	No	Aluminum	µg/L	155	36.2	50
		Chloride	mg/L	422	10	250
		Iron	µg/L	5,850	47.7	300
		Sulfate	mg/L	2,320	25	250
		Total Dissolved Solids	mg/L	3,300	350	500
AA-UW1	Yes	Chloride	mg/L	412	10	250
		Sulfate	mg/L	2,160	25	250
	No	Aluminum	µg/L	162	36.2	50
		Chloride	mg/L	415	10	250
		Iron	µg/L	2,080	47.7	300
		Manganese	µg/L	58.6	3.1	50
		Sulfate	mg/L	2,150	25	250
		Total Dissolved Solids	mg/L	3,100	350	500
AA-UW2	Yes	Chloride	mg/L	500	10	250
		Sulfate	mg/L	1,920	25	250
	No	Chloride	mg/L	512	10	250
		Iron	µg/L	1,290	4.8	300
		Sulfate	mg/L	1,970	25	250
		Total Dissolved Solids	mg/L	4,200	350	500
AA-UW3	Yes	Chloride	mg/L	253	10	250
		Sulfate	mg/L	3,130	25	250
	No	Aluminum	µg/L	74.7	36.2	50
		Chloride	mg/L	267	10	250
		Iron	µg/L	1,370	47.7	300
		Sulfate	mg/L	3,280	25	250
		Total Dissolved Solids	mg/L	3,500	350	500

[a] Parameters for which Nevada Basic Comparison Levels are not established were compared to U.S. EPA MCLs

SQL = Sample quantitation limit
MCL = Maximum contaminant level
mg/L = Milligrams per liter
µg/L = Micrograms per liter

Table 6b. Summary of Groundwater Sampling Data, Upgradient Wells
Detections Exceeding U.S. EPA Maximum Contaminant Levels
Eastside 2009 Groundwater Sampling Event
Page 2 of 2

Well	Filtered?	Analyte	Unit	Result	SQL	Secondary MCL [a]
AA-UW4	Yes	Chloride	mg/L	305	10	250
		Sulfate	mg/L	2,900	25	250
	No	Chloride	mg/L	306	10	250
		Iron	µg/L	4,580	47.7	300
		Sulfate	mg/L	2,930	25	250
		Total Dissolved Solids	mg/L	3,700	350	500
	Yes	Chloride	mg/L	307	10	250
		Sulfate	mg/L	2,970	25	250
	No	Aluminum	µg/L	64.1	36.2	50
		Chloride	mg/L	304	10	250
		Iron	µg/L	4,480	47.7	300
		Sulfate	mg/L	2,920	25	250
		Total Dissolved Solids	mg/L	4,300	350	500
AA-UW5	No	Aluminum	µg/L	615	36.2	50
		Iron	µg/L	910	47.7	300
		Total Dissolved Solids	mg/L	600	350	500
		Iron	µg/L	586	47.7	300
		Total Dissolved Solids	mg/L	700	350	500
AA-UW6	Yes	Sulfate	mg/L	2,260	25	250
	No	Iron	µg/L	4,550	47.7	300
		Sulfate	mg/L	2,240	25	250
		Total Dissolved Solids	mg/L	3,700	350	500

[a] Parameters for which Nevada Basic Comparison Levels are not established were compared to U.S. EPA MCLs
SQL = Sample quantitation limit
MCL = Maximum contaminant level
mg/L= Milligrams per liter
µg/L = Micrograms per liter

Appendix A

Response to Comments and Revised Text

Response to Nevada Division of Environmental Protection (NDEP) Comments, dated February 20, 2010, to *Revised Upgradient Wells Report, BMI Common Areas, Eastside Area,* dated February 11, 2010, NDEP Facility ID# H-000688

1. Section 2.1, page 5, BRC notes that the Shallow Zone occurs at much deeper depths in the upgradient areas and is absent on the eastern side of the Site. BRC needs to consider and discuss how this may effect the concentrations of metals and other compounds.

Response: The revised report Section 2.4 includes a cross section that illustrates the relationship between shallow zone groundwater off-site to the east and the upgradient wells. As discussed in the revised report, groundwater in Layer 2 wells (screened in the TMCf only) may have some relatively higher metal concentrations, such as arsenic in well AA-UW-6, that are reflective of the higher TMCf background metals concentrations.

2. Section 2.4.1, page 10, BRC should also consider discussing the supplemental shallow soils background data set as the unique concentrations at well AA-UW-6 may be related to this geologic issue. A Figure should be developed and referenced that shows this relationship.

Response: As discussed in the revised report, metals concentrations detected in well AA-UW-6 can be attributable to higher background metals concentrations detected in the supplemental shallow soil background dataset. As discussed in the response to Comment 1, a cross section has been included in the revised report to show the proximity of AA-UW-6 to borings in the supplemental shallow soil background dataset. All AA-UW-6 soil metals detections (maximum concentrations), however, are less than metals concentrations in the supplemental shallow soil background dataset.

3. Section 2.4.2, page 14, the NDEP has the following comments:
   a. BRC needs to evaluate the soils data versus leaching based BCLs and perhaps develop site-specific leaching based screening levels for comparison and discussion. Please refer to the NDEP's January 16, 2010 guidance on this topic. Sole comparison to human health based screening criteria does not address the issues that need to be considered. This is a global issue that needs to be addressed throughout the Deliverable.

Response: Section 2.4 has been revised to include a comparison of the detected metals concentrations to leaching-based BCLs (LBCLs) in accordance with NDEP's January 2010 guidance.

   b. In addition, BRC acknowledges that the soils data "may be representative of some residual impacts" and numerous comparisons to background fail. This issue needs further consideration and discussion regarding why these locations are applicable to upgradient conditions. This is a global issue that needs to be addressed throughout the Deliverable.

Response: Revised Section 2.4.5 discusses the results of the data comparison to LBCLs (see above Comment 3a), which indicates that the wells are suitable as upgradient wells.

4. Section 2.4.3, page 15, last paragraph, BRC is using an order of magnitude comparison to differentiate upgradient soils data from site soils data. This seems to be an excessive range and BRC should discuss this matter with NDEP.

Response: BRC will discuss this comparison with NDEP. This section has been revised to omit the comparison based on an order of magnitude. As noted in the report, all nonmetals detections at AA-UW-6 are less than BCLs.

5. Section 2.4.5.1, page 16, NDEP has the following comments:
   a. Since the upgradient Piper and Stiff diagrams are similar to on-Site diagrams it is not clear to the NDEP how this is indicative of a lack of impacts to the upgradient wells.

Response: The Piper and Stiff analysis has only limited application to the comparison of upgradient and on-site groundwater quality. The analysis is only intended to show that upgradient and on-site groundwater are geochemically similar with respect to the ion data, but impacts may be evident from other analyses, such as analysis for VOCs in groundwater. BRC contends that it is not necessary to indicate a lack of impacts for wells that are designated as "upgradient" and not "background" locations.

   b. Due to the absence of the upgradient Piper and Stiff diagrams, NDEP considers this analysis and discussion incomplete.

Response: The revised report includes an appendix of available Shallow Zone Piper and Stiff diagrams from TIMET for reference.

6. Figure 2, NDEP has the following comments:
   a. This Figure doesn't appear to support the hypothesis of continued chemical transport from the BMI Complex to the BMI Common Areas with the exception of the northeast corner of the TIMET property.

Response: Comment noted. BRC will continue to evaluate groundwater flow and transport in the off-site areas as more contemporaneous data become available. It is also noted, however, that significant impacts to groundwater quality from multiple analytes at the proposed upgradient well locations are present at the plants area and, specifically, downgradient of the northeast corner of the TIMET property. BRC also notes that isoconcentration contours for various chemicals presented in the recently submitted *2009 Groundwater Monitoring Report, BMI Common Areas (Eastside),* and also included in this revised report (Appendix G), provide additional support for the hypothesis of continued chemical transport from the BMI Complex to the BMI Common Areas.

With respect to groundwater elevation contouring, BRC notes that upgradient anthropogenic complexities introduced in the BMI Complex over the years (such as barrier walls and injection trenches) may have altered groundwater flow patterns. It is also noted that deep drilling, sampling, and well completion beneath the Qal/TMCf contact in the BMI Complex has been limited. Thus, it

is not possible to observe whether deeper chemical impacts and flow paths within the BMI Complex may be affecting chemical transport. The disparity between the groundwater flow contours and the isoconcentration contours would indicate that the issue of potential deeper flow paths within the BMI Complex merits further investigation. This discussion has been added to the revised report.

b. NDEP also acknowledges that the groundwater elevation does not appear to correlate well to chemical concentration contours. BRC should consider and discuss the concept of chemical transport from the Middle Zone to the Shallow Zone as it is the understanding and belief of the NDEP that the flow paths in the Middle Zone differ from those in the Shallow Zone. Figures would also need to be developed to support this hypothesis.

Response: BRC concurs with NDEP's acknowledgement while recognizing that additional data beneath the Shallow Zone within the plants areas are needed to validate NDEP's beliefs. Also, please see response to Comment 6a. In addition, the revised report includes a cross section that illustrates the relationship between the plants area and the western boundary of the BRC Eastside property. Based solely on elevation, the upper Middle Zone at the plants area corresponds to the Shallow Zone at BRC Eastside, since the plants area is topographically higher than the BRC Eastside property. That is, 130 feet below grade at the plants area is approximately 1,700 feet in elevation above mean sea level, and this elevation corresponds to approximately 50 feet below grade at the Eastside property. As a result, Middle Zone and Layer 2 Shallow Zone impacts at the plants area may be contributing to Shallow Zone Layer 1 impacts at the Eastside. As discussed in the revised isotope report, dated April 21, 2010, the plants area is located closer to the regional recharge area while the BRC Eastside is located in the "pressure area," which is designated on the cross section. This discussion has been added to the revised report.

7. Table 3, this Table and others need comparisons to the NDEP BCLs and LBCLs.

Response: None of the nonmetals detections exceed BCLs. A screening against LBCLs was completed and a new table has been added to the report to show the results of the screening.

8. Appendix C, Figure C-2, NDEP has the following comments:
   a. Regarding location AA-UW-6, in addition to the possible impacts relating to depth, and geology (supplemental shallow soils background data); BRC also needs to consider impacts to soils in the Mohawk sub-area as they relate to this location.

Response: The metals data from well boring AA-UW-6 have been compared to the supplemental shallow soil background dataset and the results are included in the revised report as Table 2. As discussed in the report, the metals concentrations detected in the AA-UW-6 soil samples fall below the background concentrations. Note that while well AA-UW-6 has higher arsenic concentrations than downgradient wells, AA-UW-6 has lower concentrations of carbon tetrachloride, total and hexavalent chromium, manganese, PCE, perchlorate, Ra 226+228, selenium, and TTHMs. Well AA-UW-6 appears to be affected by upgradient sources of arsenic, but there does not appear to be an off-site source of these other analytes upgradient of AA-UW-6. This discussion has been added to the revised report.

b. Location AA-UW-6 is elevated in concentration relative to downgradient wells, this needs consideration and discussion relative to selection of this location as an upgradient location.

Response: Please see the responses to Comments 8a and 8c.

c. Locations AA-UW-1, -4 and -6 appear to be elevated in concentration relative to other upgradient locations and locations upgradient of the BMI Complex. This issue requires consideration and discussion.

Response: Please see the response to Comment 8a. These wells are screened in Layer 2 (TMCf only), and the arsenic concentrations are reflective of the higher arsenic background concentrations in the TMCf. For well AA-UW-6, the arsenic concentrations are reflective of the higher arsenic concentration consistent with the supplemental shallow soil background dataset.

9. Appendix E, NDEP has the following comments:
   a. This comment has not been attended to from the August 5, 2009 review of the previous document, the Cation-Anion Balance (CAB) check algorithm (within the executable spreadsheet) for three tabulated samples is in error. For samples MCF-02A, MCF-02B and MCF-03A, the acceptable percent difference is $\pm$2%, since their anion sums are between 3 and 10 meq/L. The spreadsheet algorithm uses an acceptable difference of $\pm$5% (which applies to anion sums greater than 10 meq/L). These samples fail the CAB check; since samples MCF-02A and MCF-02B also fail the TDS checks, these samples should be qualified R-CAB&TDS; the MCF-3A sample should be qualified J-CAB. Please make these changes and build in the correct algorithm to the spreadsheet for future submittals.

Response: The algorithm has been built into the spreadsheet included in the revised report.

   b. Column "AW" of the executable spreadsheet contains an error for the algorithm that determines whether samples measured versus calculated TDS falls within the range for acceptable ratio. The range should be defined as greater than 1.0 and less than 1.2; the submitted algorithm defines the range as greater than 1.0 and less than or equal to 1.2. NDEP notes that no additional TDS checks fail this test. BRC is advised to build in the correct algorithm to the spreadsheet.

Response: The algorithm has been built into the spreadsheet included in the revised report.

Response to Nevada Division of Environmental Protection (NDEP) Preliminary Comments, dated January 8, 2010, to *Upgradient Wells Report, BMI Common Areas, Eastside Area,* dated December 30, 2009, NDEP Facility ID# H-000688

1. This figure and 5, 6,7, 8 need to be expanded to include data from the BMI Companies (if available and relatively contemporaneous and usable)….if it is not available or usable we need to discuss this report prior to resubmittal.

Response: Available water level data from TIMET (July and December 2009) and Tronox (September and October 2009) have been added to Figure 2 (Shallow Zone Groundwater Elevations 2009) for reference and review. Balanced cation/anion data or completed and NDEP-approved Piper/Stiff diagrams from the Companies are not available to supplement Figures 5, 6, 7, or 8, however. BRC will contact NDEP to discuss the revised report submittal as suggested.

2. General comment, these comments and edits are NOT meant to be comprehensive, however, since the issues are relatively basic/conceptual NDEP feels that these must be addressed before a comprehensive review is completed.

Response: Comment noted.

3. The problem is that this data is non-contemporaneous with the remainder of the report (such as the BRC data). NDEP would like BRC to verify if relatively contemporaneous data is available from the upgradient and cross gradient sources before revising this report. If it is not available we will have to discuss other ways of revising this one.

Response: Regarding Appendix C, Figure C-1 (regional flow map), please see response to Comment 1.

4. Need a figure that shows these locations.

Response: A map showing upgradient off-site boring locations was included in Appendix B of the December 30, 2009 report. Appendix B will be referenced in Section 2.1 where these borings are discussed.

5. As noted above contemporaneous data needs to be compiled and presented.

Response: Regarding Appendix C (off-site source information), please see response to Comment 1. BRC will contact NDEP regarding submittal of the revised report.

6. Which begs the question of "what about the metals?"

Response: For clarity, the last sentence of Section 2.3 has been removed and metals and nonmetals detections at the upgradient boring locations are fully discussed in Section 2.4 (instead of being only referenced in Section 2.3). The objective of Section 2.3 is to present flow modeling results.

7. NDEP has provided guidance on this issue which should be referenced herein.

Response: The following reference for the value of 0.025 has been included in the report: *Nevada Division of Environmental Protection (NDEP). 2009. Significance Levels for the Gilbert Toolbox of Background Comparison Tests. BMI Plant Sites and Common Areas Projects, Henderson, Nevada. July.*

8. Mis-spelled from here forward

Response: The spelling of "McCullough" has been corrected in the document.

9. Rudimentary comparisons could be made…e.g. exploratory data analysis

Response: In Section 2.4.1.2, in the absence of statistical analysis, a rudimentary data comparison was made with the available data. For metals with reported detections, the mean and maximum detected concentrations in AA-UW-6 were compared to mean and maximum concentrations of the same metals in the Deep River dataset.

10. Many of these comments apply to multiple sections and will not be repeated.

Response: Comment noted.

11. This begs the question of "what does this mean" and "how is this explained"

Response: Section 2.4.2, Summary of Background Metals Data Evaluation, has been added to discuss the Parcels 4A and 4B soil investigations reported in 2008 and 2009. As discussed in the investigation reports, based on the results of the investigations, data review, and a screening-level health risk assessment, exposure to residual levels of chemicals in soil at the property should not result in adverse health effects to all future on-site receptors. The NDEP agreed with this conclusion and agreed that development may proceed on the parcels without environmental restriction. NDEP's "No-Further Action (NFA)" determination for the parcels was restricted to the upper 10 feet of soil, however, since deeper soil had not been investigated at the time. While deeper soil metals detections may potentially represent residual impacts from past industrial use in the area, the deeper soil metals detections are not interpreted to be prohibitive in terms of using the proposed wells for upgradient data collection and evaluation. Section 2.4.4, Summary of Nonmetals Data Evaluation, has also been added to discuss nonmetals detections.

12. Figures are needed for this sort of issue.

Response: Please see response to Comment 1

13. BRC needs to connect the dots and explain what this means.

Response: As noted in Table 2, and Section 2.4.2, none of the nonmetals detections exceed Basic Comparison Levels for residential soil (BCLs). The relatively low detections of nonmetals, all less than BCLs, are consistent with the results of flow modeling that indicate that former pond use did not impact soils in the AA-UW-6 area. Nonmetals soil results less than BCLs at AA-UW-6 are not higher by one or more orders of magnitude than data from other borings that are located further away from the ponds in this area. The text has been revised to include this interpretation. Section 2.4.4, Summary of Nonmetals Data Evaluation, has also been added to discuss nonmetals detections and NDEP's NFA determination regarding shallow soils in Parcels 4a and 4B. While deeper soil nonmetals detections below BCLs may potentially represent residual impacts from past industrial use in the area, the deeper soil nonmetals detections are not interpreted to be prohibitive in terms of using the proposed wells for upgradient data collection and evaluation.

14. Doesn't include off-site wells ….if TIMET, TRX etc are available and usable they should be used, if they are not usable that needs to be considered and discussed in light of these conclusions.

Response: Please see response to Comment 1

15. Plots should be provided in this report….especially since the 6th quarter report has not been submitted.

Response: The isoconcentration plots for the 2009 sampling event have been added to the report as Appendix F.

16. This does not seem reasonable….there are other closer sources.

Response: The text discussing the Three Kids Mine has been removed since other potential sources are located closer than the mine.

Response to Nevada Division of Environmental Protection (NDEP) Comments, dated August 5, 2009, to *Upgradient Wells Report, BMI Common Areas, Eastside Area,* dated July 24, 2009
NDEP Facility ID# H-000688

1. General comment, due to the remaining deficiencies of the cation-anion balance the NDEP has not completed a comprehensive review of this report. It is not clear that this report will be able to be corrected until new, valid data is collected (the 2009 data set). It is suggested that BRC discuss these matters with the NDEP in order to arrive at a mutually agreeable path forward.

> ***Response:*** Comment noted and agreed. The CAB will be re-submitted with the new upcoming 2009 data.

2. Figure 2, this Figure needs to be updated with adjacent data to support BRC's discussion about the source of some of the upgradient contaminants. In addition, if BRC believes that some of the contaminants may be sourcing from the Middle Zone it would be helpful to develop plume maps and potentiometric surface maps for the Middle Zone. In addition, a discussion of vertical gradients would be needed.

> ***Response:*** The revised upgradient wells report will include an updated figure that depicts upgradient source areas. In addition, the report will include a discussion of Middle Zone hydrogeology, and vertical gradients, to further characterize upgradient impacts near well AA-01. Plume maps for the Middle Zone, and, if applicable, potentiometric surface maps, will also be included.

3. Appendix A, Response-to-Comments (RTCs), the NDEP has the following comments:
    a. RTC 3.c.iv and 3.c.v, there are a number of apparent errors that remain. Please see detailed comments below.

> ***Response:*** Comment noted.

    b. RTC 4, it is the belief that if BRC is proposing to use well AA-01 as an "upgradient" well it is important to determine the source of the PCE impact at this time. Alternately, well AA-01 can be removed as an upgradient well.

> ***Response:*** As noted above in response to Comment No.2, additional information will be included in the revised report to further characterize upgradient impacts near well AA-01.

    c. RTC 5, BRC's response does not meet the intent of the NDEP's comment. If wells do not pass the cation-anion balance it is not appropriate to generate Piper and Stiff diagrams with invalid data.

> ***Response:*** As noted above in the response to Comment No.1, the CAB will be resubmitted using the new upcoming 2009 dataset. Revised Piper and Stiff diagrams will also be resubmitted as applicable.

4. Appendix A, Cation-Anion Balance Attachment, the NDEP has the following comments:
    a. The Cation-Anion Balance (CAB) check algorithm (within the executable spreadsheet) for three tabulated samples is in error. For samples MCF-02A, MCF-02B and MCF-03A, the acceptable percent difference is $\pm$2%, since their anion sums are between 3 and 10 meq/L. The spreadsheet algorithm uses an acceptable difference of $\pm$2-5% (which applies to anion sums greater than 10 meq/L). This error does not change the test determination for these samples; they pass the CAB

check. However, BRC is advised to build in the correct algorithm to the spreadsheet for future submittals.

Response: Comment noted and agreed.

b. Column "AM" of the executable spreadsheet contains an error for the algorithm that determines whether samples measured versus calculated TDS falls within the range for acceptable ratio. The range should be defined as greater than 1.0 and less than 1.2; the submitted algorithm defines the range as greater than or equal to 0.99 and less than or equal to 1.2. NDEP notes that three additional samples fail this test, when properly administered. BRC is advised to build in the correct algorithm to the spreadsheet.

Response: Comment noted and agreed.

c. Column "AY" of the executable spreadsheet contains an error for the algorithm that lists "Data Flags from Quality Checks". Specifically, the Data Flag A (Outside acceptable limits for Cation-Anion Balance for 10.0-800 meq/L Anion Sum.), is being applied to all samples that failed the CAB check, rather than those samples whose anion sums are outside the acceptable limits for the check. NDEP notes that sixteen samples qualify for Data Flag A, versus the reported 42 samples. BRC is advised to build in the correct algorithm to the spreadsheet.

Response: Comment noted and agreed.

d. The upper limit of acceptable Lab-TDS to EC ratio (1.47, estimated using graphed data) is in error. Please inspect the axes on the graph used to generate this estimate; NDEP notes that the correct ratio is the reciprocal of 1.47 (approximately 0.68), which is close to the value of 0.7 specified in Standard Methods. NDEP notes that, using the range indicated in Standard Methods, 96 samples fail this test, versus the reported 20 samples.

Response: Comment noted and understood. BRC will review and revise the ratio estimate with the incoming 2009 dataset. Per the suggestion of NDEP, BRC will refer to the following document for guidance: Hem, John D., 1985. Study and Interpretation of the Chemical Characteristics of Natural Water, Third Edition, U.S. Geological Survey Water-supply Paper 2254 (reprinted 1989).

e. For samples where cation concentrations were estimated (wells MCF-05 and MCF-07), it is not proper to perform Correctness Checks. The estimated values are useful for Piper and Stiff charts (such data requires notes of estimation on each product), however it is misleading to perform correctness checks which indicate "Pass" or otherwise.

Response: Comment noted and agreed.

Nevada Division of Environmental Protection Response to: ***Response to Nevada Division of Environmental Protection (NDEP) Comments, dated August 5, 2009, to Upgradient Wells report, BMI Common Areas, Eastside Area, dated July 24,2009*** **dated August 7, 2009**
NDEP Facility ID# H-000688

The NDEP has received and reviewed BRC's document identified above and finds that the document is acceptable with the following clarifications noted.

1. Response-to-comment (RTC) 2, please note that the evaluation of the Middle Zone hydrogeology and vertical gradients should not be constrained to location AA-01. BRC needs to expand this evaluation to any area where the discussion is applicable.

   Response: Comment noted and agreed.

2. General comment, NDEP expects that a revised submittal date for the Upgradient Wells Report will be determined once the 2009 data has been collected.

   Response: Comment noted and agreed.

Table of Contents

List of Figures

List of Figures (Continued)

Figure **Page**

List of Tables

Table

List of Appendices

Appendix

1. Introduction

This report identifies and provides technical justification for the selection of upgradient wells for use in monitoring groundwater quality in the Shallow Zone at the Eastside area of the Basic Management, Incorporated (BMI) Common Areas/Complex (the "Site") in Clark County, Nevada (Figure 1). Proposed existing wells are identified to be used for upgradient monitoring purposes, and the rationale and criteria used to propose the wells are presented and discussed.

The scope of work for this report has previously been discussed between Basic Remediation Company (BRC) and Nevada Division of Environmental Protection (NDEP) representatives, in an NDEP meeting on February 4, 2009 and in written correspondence to BRC dated February 20, 2009. Preliminary NDEP comments dated January 8, 2010 regarding the draft of this report dated December 30, 2009 are addressed in this revised report (Appendix A); Appendix A also includes **responses to** NDEP comments dated August 5 and 7, 2009**,** regarding the July 24, 2009 draft of this report**, and responses to NDEP comments dated February 20, 2010, regarding the February 11, 2010 draft of this report**.

1.1 Location and Setting

The Site is located in Clark County, Nevada, and is situated approximately 2 miles west of the River Mountains and 1 mile north of the McCullough Range. As shown in Figure 1, the area surface topography slopes in a westerly to northwesterly direction from the River Mountains and in a northerly to northeasterly direction from the McCullough Range. Near the Site, the surface topography slopes in a northerly direction toward Las Vegas Wash.

The uppermost water-bearing zone (referred to as the Shallow Zone) is unconfined and occurs primarily in Quaternary alluvium (Qal). At some locations on portions of the Site, Shallow Zone groundwater is first encountered in the uppermost portion of the Tertiary Muddy Creek Formation (TMCf). This unconfined Shallow Zone groundwater generally flows in a northerly direction toward Las Vegas Wash. The Shallow Zone groundwater is generally continuous across the Site, but there are areas where Shallow Zone wells are dry. **To distinguish between unconfined groundwater occurring in the two lithologies, the Shallow Zone is further divided into Layer 1 (Qal only) and Layer 2 (TMCf only).**

Below the Shallow Zone, deeper groundwater occurs in sporadically encountered lenses under pressure in the Middle Zone, designated between approximately 90 and 270 feet below grade. A coarser-grained facies of the TMCf occurs off-site and in the southwest portion of the study area (at Location 27, for example). The proportion of coarser-grained sediments in the upper portion of the TMCf decreases to the north beneath the Site. This more permeable TMCf facies is interpreted as being caused by an influx of slightly coarser alluvial deposits into the older lacustrine depositional environment. One possible ramification of the presence of these coarser TMCf sediments near the southwestern border of the Site is that they may serve as a potential pathway for chemicals to migrate into the TMCf.

Deep Zone groundwater is generally continuous across the Site and is characterized with wells screened below 270 feet below ground surface (ft bgs) to a maximum nominal depth of 400 ft bgs. Groundwater elevation data from the last several rounds of groundwater monitoring (2006 through 2009) show that Deep Zone groundwater is confined, and the potentiometric surface of Deep Zone groundwater is oriented generally north toward Las Vegas Wash (MWH, 2008).

Vertical gradients at the Eastside area, as measured in the six Eastside monitoring events, have been generally upward. A summary table and figure of vertical gradient data is presented in the BRC report entitled, *Evaluation of Hydrogeologic Zone Connectivity Through Tritium and Stable Isotope Sampling and Analysis*" dated December 29, 2009 (DBS&A, ~~2009b~~**2010**).

The generally upward gradient condition is consistent with the position of the Site at the relatively distal end of two coalescing alluvial deposits from the McCullough Range and the River Mountains. In general, high-energy alluvial sediments are deposited near their source, resulting in a geologic profile dominated by coarser-textured soils that are conducive to downward recharge of precipitation and mountain runoff. At more distal locations, it is common to encounter lower-energy alluvial sediments that result in a geologic profile dominated by finer-textured soils. The distal portions of alluvial deposits often comprise pressure zones where confining or semiconfining zones exist. Water in these zones is often laterally recharged at depth, resulting in pressure buildup that is sustained by the head of water created in the upslope vertical recharge zones. At more proximal locations, such as the off-site plants area, the gradient would be expected to be more typically downward. For example, downward vertical gradients have been measured in well pairs AA-01/MCF-01B (DBS&A, ~~2009b~~**2010**).

Separate NDEP-approved project documents provide further information regarding area geology and hydrogeology, soils, history, and investigations completed to date (e.g., BRC et al., 2007; DBS&A, ~~2009b~~**2010**).

1.2 Objective

The objective of this report is to present and justify the criteria used in the selection of the upgradient wells for monitoring groundwater quality in the Eastside area. Upgradient wells need to be designated at the Site in order to document and evaluate the quality of groundwater flowing onto the Site from off-site areas. Data from the upgradient wells can then be compared to data from on-site wells, along with comparison to state and federal water quality standards, to assist in the evaluation of Site impacts. Upgradient well data will also be used, in part, for remedial decision-making. As discussed in Section 2.1, it is not possible to install background monitoring wells at this Site. As a result, proposed upgradient wells will be used for data evaluation.

2. Upgradient Well Selection

The upgradient wells are located according to the following selection criteria:

- Hydraulically upgradient
- Along the majority of the upgradient site boundary
- Where off-site upgradient groundwater impacts, if present, are well characterized

Proposed upgradient wells must also be properly constructed to represent the hydrogeologic zone of interest. To qualify as Shallow Zone upgradient wells at the Site, the proposed wells must be adequately screened in the Shallow Zone. At the Eastside area, the following wells meet the criteria listed above (Figure 2) (Appendix B):

- AA-01
- AA-27
- AA-UW-1
- AA-UW-2
- AA-UW-3
- AA-UW-4
- AA-UW-5
- AA-UW-6

2.1 Groundwater Occurrence and Flow Direction

Figure 2 presents a regional map of the Shallow Zone potentiometric surface at the Site based on 2009 data. As discussed in Section 1.1, Shallow Zone groundwater occurs in **both** the Qal and the uppermost TMCf at the Site~~.~~ **and is therefore further divided into Layer 1 (Qal only) and Layer 2 (TMCf only).** Flow direction in the Shallow Zone is directed generally to the north toward Las Vegas Wash.

Flow direction has been roughly consistent over the last several rounds of water level measurement at the Site, completed in 2006, 2007, 2008 (MWH, 2008) and 2009. As shown on Figure 2, the proposed upgradient wells are located at the southern, southwestern, and southeastern boundaries of the Eastside area, and are well distributed along the Site perimeter in this area. This portion of the Site perimeter is the upgradient boundary of the Eastside area.

Several soil borings were completed in the off-site upgradient areas as part of the background metals investigation (BRC and ERM, 2009a) (Appendix B). Based on these borings, it appears that Shallow Zone groundwater occurs at much deeper depths further upgradient and ~~the Shallow Zone~~ is absent **in the Qal** further upgradient to the east. **This relationship is illustrated in Figure 3, which shows a cross section through well AA-UW-6 to the northwest and southeast.** As identified by wet soil logged in the field, groundwater was encountered in only 2 of the 23 borings. Groundwater was encountered at 140 ft bgs in boring DBSA-17 and at 84.7 ft bgs in boring DBSA-20.

The other background metals soil borings (except DBSA-33) were drilled between 80 and 160 ft bgs, but only moist soil was logged (boring DBSA-33 was terminated at 32.5 feet when the TMCf was encountered). Since groundwater occurs at deeper depths further upgradient and off-site, additional wells installed in these areas would likely be screened in a different hydrogeologic unit than the existing on-site wells. The proposed upgradient wells are screened in the same hydrogeologic unit as on-site Shallow Zone wells (Table 1, Appendix B). **Proposed upgradient wells AA-UW-1, -2, -4, -5, and -6 are installed in Layer 2 of the Shallow Zone (screened in the TMCf only), in which groundwater first occurs along the eastern Site boundary. Wells AA-01, AA-27 and AA-UW-3 are screened in Layer 1 (Qal only), in which groundwater first occurs along the western Site boundary.**

Appendix C (Figure C-1) contains a 2006 regional groundwater flow map prepared by TIMET (2007) that covers the Eastside area as well as adjacent properties upgradient to the south and west. The direction of groundwater flow in the regional flow map is also oriented generally to the north toward Las Vegas Wash.

Upgradient anthropogenic complexities introduced in the BMI Complex over the years (such as barrier walls, extraction well fields, and injection trenches) may have altered

groundwater flow patterns. It is also noted that deep drilling, sampling, and well completion beneath the Qal/TMCf contact in the BMI Complex has been sparse. Thus, only limited conclusions can be drawn regarding whether deeper chemical impacts and flow paths within the BMI Complex may be affecting chemical transport in the region.

Based solely on elevation, the upper Middle Zone at the plants area corresponds to the Shallow Zone at BRC Eastside, because the plants area is topographically higher than the BRC Eastside property. That is, 130 feet below grade at the plants area, which is approximately 1,700 feet in elevation above mean sea level, corresponds to approximately 50 feet below grade at the Eastside property. As a result, Middle Zone and Layer 2 Shallow Zone impacts at the plants area may be contributing to Shallow Zone Layer 1 impacts at the Eastside. As discussed in the revised isotope report dated April 21, 2010 (DBS&A, 2010), the plants area is located closer to the regional recharge area, while the BRC Eastside is located in the "pressure area" (Figure 4).

2.2 Historical Site Use and Facility Operations

Historical site use and facility operations are detailed for the Eastside area in the 2007 Closure Plan (BRC et al., 2007) and in other related BRC documents. As described in the Closure Plan (BRC et al., 2007) the Eastside area covers approximately 2,321 contiguous acres. The Eastside area lies to the east of Boulder Highway and to the north of Lake Mead Parkway and includes land on which:

- Unlined wastewater effluent evaporation/infiltration ponds (and associated conveyance ditches) were built and into which various plant wastewaters were discharged from 1942 through 1976.

- Effluent from the adjacent TIMET plant was disposed of through the use of a spray irrigation wheel used between 1985 and 1990.

- Lined wastewater effluent ponds were constructed, into which effluent from the TIMET plant was discharged from 1976 to 2005.

- The City of Henderson constructed municipal wastewater infiltration basins (e.g., the Southern rapid infiltration basins [RIBs]).

- Unlined wastewater effluent ponds were constructed, but were never used.

The proposed upgradient wells are generally located within those areas of the Site that were not used for the operations described above. The land in the vicinity of the upgradient wells has remained primarily open desert, with relatively minor adjacent property development for residential or commercial (non-industrial) use. Upgradient wells AA-UW-5 and AA-UW-6 are relatively close to the southern boundary of the upper ponds. Wells AA-01 and AA-UW-1 are relatively close to the now-closed TIMET ponds that were built on top of the former upper ponds. Wells AA-01, AA-UW-1, and AA-27 are adjacent to the active BMI Complex.

Appendix C provides selected information extracted from various reports and documents that summarize off-site source information for the plants area upgradient to the south and west. Included in Appendix C is a regional map from 2006 that shows flow from the plants area toward proposed upgradient wells AA-01 and AA-27. A regional map of arsenic detections in groundwater (from various dates) is also included that shows arsenic impacts originating at the plants area. Regional plume maps (2006) for nitrate, chloride, sulfate, total dissolved solids (TDS), and selected metals and volatile organic compounds (VOCs) are also included. A map and table summarizing Tronox (formerly Kerr-McGee Chemical LLC) source areas is included for reference. As discussed in Section 2.4.3, the plants area is interpreted to be the likely source for some of the groundwater impacts detected in the proposed upgradient wells.

2.3 Modeling Results

BRC submitted a draft groundwater flow model calibration report to the NDEP in 2009 (DBS&A, 2009~~a~~) (subsequently approved by NDEP). An evaluation of the potential historical mounding was completed using the updated flow model. Pond recharge was estimated at 48.18 inches per year (Figure ~~3~~**5**). Heads were simulated for this condition to produce a groundwater flow map representing the period of time that the lower ponds were in use (Figure ~~4~~**6**). The simulation indicates that groundwater flow was oriented primarily to the north near the locations

of upgradient wells AA-01, AA-UW-1, AA-27, AA-UW-2, AA-UW-3, A-UW-4, and AA-UW-5. The simulation also indicates that localized mounding is present at the lower ponds, and flow is radial for a small area around the ponds. The location of well AA-UW-6 appears to be marginally within the area of the localized mounding.

The remaining upgradient wells are located outside the area of modeled localized mounding caused by pond use. Flow direction near the former ponds and at well AA-UW-6 has since returned to its original northwesterly direction (Figure 2, Figure C-1). As discussed in Section 2.4, the soil and groundwater data from well AA-UW-6 do not appear to reflect unique impacts due to former pond use.

2.4 Soil and Groundwater Impacts

Selected analytical data for the upgradient well locations are discussed below in Sections 2.4.1 through 2.4.3.

2.4.1 Soil Data for Metals

The background metals dataset for the Eastside area (BRC and ERM, 2009a) was compared to the range of metals concentrations data collected from the upgradient well locations (Appendix D) (excluding duplicates). The following metals from the Site-related chemicals (SRC) list were evaluated:

- Radionuclides
  - Radium-226
  - Radium-228
  - Thorium-228
  - Thorium-230
  - Thorium-232
  - Uranium-233/234
  - Uranium-235/236
  - Uranium-238

- Metals
  - Aluminum
  - Antimony
  - Arsenic
  - Barium
  - Beryllium
  - Boron
  - Cadmium
  - Calcium
  - Chromium (VI)
  - Chromium (total)
  - Cobalt
  - Copper
  - Iron
  - Lead
  - Lithium
  - Magnesium
  - Manganese
  - Mercury
  - Molybdenum
  - Nickel
  - Niobium

In accordance with the BRC Closure Plan (BRC et al., 2007), background metals comparisons were performed using the Quantile test, Slippage test, t-test, and Wilcoxon Rank Sum test with Gehan modification. The Quantile test, Slippage test, and Wilcoxon Rank Sum test are nonparametric; that is, the tests are distribution-free, and an assumption of whether the data are normally or lognormally distributed is therefore not necessary. The computer statistical software program Guided Interactive Statistical Decision Tools (GISdT) (Neptune and Company, 2007) was used to perform all statistical comparisons, with a decision error of alpha equal to 0.025.

The Wilcoxon Rank Sum test analyzes the difference between the ranks for two populations. This is a nonparametric method of assessing differences in the centers of the distributions that relies on the relative rankings of data values. Knowledge of the precise form of the population distributions is not necessary. When the data are normally distributed, the Wilcoxon Rank Sum test has less power than the two-sample t-test, but the assumptions are not as restrictive. The GISdT version of the Wilcoxon Rank Sum test uses the Mantel approach, which is equivalent to using the Gehan ranking system (Neptune and Company, 2007).

The Quantile test addresses tail effects that are not addressed in the Wilcoxon Rank-Sum test. The Quantile test looks for differences in the right tails (upper end of the dataset) rather than central tendency as the Wilcoxon Rank-Sum test does. The Quantile test was performed using a defined quantile equal to 0.80 (Neptune and Company, 2007).

The Slippage test looks for a shift to the right in the extreme right tail of the background dataset versus the extreme right tail of the site dataset. This is equivalent to asking if a set of the largest values of the site distribution are significantly larger (in a statistical sense) than the maximum value of the background distribution (Neptune and Company, 2007).

Typically, an alpha equal to 0.05 is used to evaluate a statistically significant result (Neptune and Company, 2007). Since several correlated tests were conducted, a lower alpha was selected. As more tests are performed, it is more likely that a statistically significant result will be obtained purely by chance. Given the use of multiple statistical tests, an alpha equal to 0.025 was selected according to NDEP guidance (NDEP, 2009a) as a reasonable significance level (p).

If an individual test p-value is less than 0.025, the test result is interpreted to indicate that the metal exceeds background levels. Additional factors, such as detection frequency and mean or median values, are also reviewed to determine if a metal exceeds background levels.

Metals data from the upgradient well borings and nearby soil borings SB-01 and SB-27 were sorted into the following groups based on sample depth and the geographic location of the boring:

- Shallow Qal (samples from less than 20 ft bgs): Data were compared to the Shallow McCullough dataset, the Shallow Mixed dataset, or the Shallow River dataset.

- Deep Qal (samples from greater than or equal to 20 ft bgs, but collected above the contact between the Qal and Upper Muddy Creek formation [UMCf]): Data were compared to the Deep McCullough dataset, the Deep Mixed dataset, or the Deep River dataset.

- TMC (samples collected from the UMCf (below the Qal/TMCf contact): Data were compared to TMC dataset.

The River datasets represent background metals characterized from soils collected in the shallow alluvial fan system originating in the River Mountains to the east of the Site. The McCullough datasets represent background metals characterized from soils collected in the shallow alluvial system originating in the McCullough Range to the south/southwest of the Site. The Mixed datasets represent background metals characterized from soils collected in the shallow alluvial system originating from both the River Mountains and the McCullough Range, where the two fan systems coalesce.

Data from upgradient well boring AA-UW-5 were compared to the Mixed datasets because this boring is located where the River Mountains alluvial fan system and the McCullough Range fan system coalesce. Data from upgradient well boring AA-UW-6 were compared to the River datasets because this boring is located within the River Mountains alluvial fan system. All other borings (including soil borings SB-01 and SB-27) fall within the McCullough Range fan system, so these remaining data were compared to the McCullough datasets (BRC and ERM, 2009a). Deep data below the Qal/UMCf contact were compared to the TMC dataset.

2.4.1.1 Shallow Metals (less than 20 feet below grade)

The shallow background metals comparison for upgradient well borings AA-UW-5 (Shallow Mixed dataset) and AA-UW-6 (Shallow River dataset) could not be completed because, with only two samples per boring (not a total of four in a usable set), there is an insufficient number of detections to use for the statistical calculations.

The background metals comparison for the upgradient well borings falling into the McCullough grouping (all borings except AA-UW-5 and AA-UW-6) indicates that the following metals were detected above background:

- Boron
- Chromium (VI)
- Total chromium
- Iron
- Niobium
- Silver
- Sodium
- Strontium
- Titanium
- Tungsten
- Vanadium

2.4.1.2 Deep Metals (greater than 20 feet below grade and above the Qal/UMCf contact)

The deep background metals comparison for upgradient well boring AA-UW-6 (Deep River dataset) could not be completed because, with only two samples in the boring, there is an insufficient number of detections to use for the statistical calculations.

In the absence of statistical analysis, a rudimentary comparison was made with the available data. For metals with reported detections, the mean and maximum detected concentrations in AA-UW-6 were compared to mean and maximum concentrations of the same metals in the Deep River dataset. The following metals detected in the AA-UW-6 soil samples exceed the mean background in the Deep River dataset:

- Cadmium
- Calcium
- Lithium
- Manganese
- Molybdenum

- Silicon
- Tungsten
- Uranium
- Radium-226
- Thorium-228
- Thorium-230

Thorium-230 is the only metal detected in the AA-UW-6 soil samples that had a maximum detected concentration that exceeds the maximum detected value in the Deep River dataset.

The background metals comparison for the upgradient borings falling into the Deep McCullough grouping (all borings except AA-UW-5 and AA-UW-6) indicates that the following metals were detected above background:

- Aluminum
- Barium
- Boron
- Chromium (VI)
- Total chromium
- Iron
- Lead
- Manganese
- Selenium
- Silicon
- Thallium
- Titanium
- Zinc

The background metals comparison for the upgradient well boring AA-UW-5 falling into the Mixed Deep grouping indicates that the following metals were detected above background:

- Silicon

- Sodium
- Strontium

2.4.1.3 Deep Metals (below the Qal/UMCf contact)

The background metals comparison for the upgradient boring data collected below the Qal/UMCf contact (all borings) indicates that the following metals were detected above background in the TMC dataset:

- Beryllium
- Boron
- Cadmium
- Chromium (VI)
- Total chromium
- Copper
- Magnesium
- Molybdenum
- Selenium
- Silicon
- Sodium
- Thallium
- Tungsten
- Uranium
- Zinc
- Radium-226
- Thorium-230
- Uranium-233/234
- Uranium-238

2.4.1.4 ***Supplemental Shallow Soil Background Dataset AA-UW-6 Comparison***

The soil metals data from boring AA-UW-6 were compared also to the background metals concentrations detected in the supplemental shallow soil background dataset (ERM West, 2009). None of the metals detected in AA-UW-6 soil samples exceeded

background metals concentrations detected in the supplemental shallow soil background dataset (Table 2).

While well AA-UW-6 has higher arsenic concentrations than downgradient wells, this well has lower concentrations for carbon tetrachloride, total and hexavalent chromium, manganese, PCE, perchlorate, Ra 226+228, selenium, and TTHMs. Well AA-UW-6 appears to be affected by upgradient sources of arsenic, but there does not appear to be an off-site source of these other analytes upgradient of AA-UW-6.

2.4.2 Summary of Metals Data Evaluation

The upgradient wells and well borings are located within BRC Parcels 4A and 4B. An investigation of soil conditions in these parcels was reported in 2008 and 2009 (BRC and ERM, 2008b, 2009b). As discussed in the investigation reports, based on the results of the investigations, data review, and a screening-level health risk assessment, exposure to residual levels of chemicals in soil at the property should not result in adverse health effects to any future on-site receptors (BRC and ERM, 2008b, 2009b). The NDEP agreed with this conclusion and agreed that development may proceed on the parcels without environmental restriction (NDEP, 2008, 2009b). However, NDEP's No-Further Action (NFA) determination for the parcels was restricted to the upper 10 feet of soil (in which relatively low metals concentrations had been measured), because deeper soil had not been evaluated.

While metals detections in soils deeper than 10 ft bgs may be representative of some residual impacts from past industrial site use in the area, these deeper soil metals detections that are excluded from the NFA should not prohibit the use of the proposed wells for upgradient data collection and evaluation.

In addition to the 2008 and 2009 investigations, pH was measured in soil samples from the upgradient well borings in 2004 and 2007 (BRC and ERM, 2008a; MWH, 2006). Data for pH was collected from borings AA-UW-1 through AA-UW-6 (10 to 80 ft bgs), boring SB-01 (0 to 93 ft bgs), and boring SB-27 (0 to 107 ft bgs). For all samples, the measured values for soil pH ranged from 7.6 to 9.6. These pH data indicate that soil conditions were not acidic in the

upgradient well borings and that conditions favorable for metals reduction, mobilization, and leaching were not present.

As discussed in Section 2.4.5, soil metals concentrations detected above groundwater were screened against both the background metals datasets (Section 2.4.1) and the leaching-based Basic Comparison Levels (LBCLs) from NDEP (2010). Except for one detection of aluminum in boring AA-UW-5, all metals that exceed background concentrations fall below the LBCLs (Table 2). Metals concentrations that exceed LBCLs are all below background metals concentrations.

2.4.3 Soil Data for Nonmetals

The results of laboratory analyses for nonmetals in soil samples representative of borings located in the upgradient well areas were compared to the Nevada Basic Comparison Levels (BCLs). Because no comparison was being made to background concentration levels, there was no need to group the soil samples by depth, as was the case for the evaluation of metals in soil samples.

Table ~~2~~ **3** presents a statistical summary of nonmetals detected in soil samples collected from the upgradient well borings and adjacent borings SB-01 and SB-27. Table ~~3~~ **4** summarizes selected analyte detections for each well boring. Compounds detected in the upgradient borings include organochlorine pesticides, organophosphate pesticides, and VOCs. None of the detections, however, exceed BCLs.

Up to 2.5 milligrams per kilogram (mg/kg) perchlorate was detected at 60 ft bgs in soil boring SB-01, drilled near upgradient well AA-01 (Table ~~3~~**4**). Perchlorate was also detected at more shallow depths in this boring. Perchlorate was also detected in groundwater samples from well AA-01 and the other upgradient wells. The detected concentrations may not be Site-related and may be due to historical perchlorate use and release at adjacent upgradient and cross-gradient facilities (such as Tronox and AMPAC).

Similarly, relatively low concentrations of VOCs (less than 60 micrograms per kilogram [µg/kg]) have been detected in soil samples from the well borings (Table ~~3~~**4**). Tetrachloroethene (PCE)

was detected up to 7.7 μg/kg in soil samples from borings completed near wells AA-01 and AA-UW-5. Trichloroethene (TCE), a degradation daughter compound of PCE, was not detected in soil samples from the upgradient well locations. However, both PCE and TCE have been detected in the upgradient groundwater well samples.

As discussed in Section 2.3, boring AA-UW-6 appears to be marginally within the area of former localized mounding due to pond use. Shallow groundwater flow near AA-UW-6 has since returned to its original northwesterly direction. The soil data from boring AA-UW-6 do not appear to reflect unique historical impacts from former use of the upper evaporation ponds, which is consistent with the conclusion from flow modeling that former pond use did not significantly impact soil in the area. ~~That is, nonmetals at this boring location were not detected at concentrations that are one or more orders of magnitude higher than the relatively low-concentration detections in the other upgradient well borings. In addition, as noted above, all detections are less than BCLs.~~

2.4.4 Summary of Nonmetals Data Evaluation

As discussed in Section 2.4.2, the upgradient wells and well borings are located within BRC Parcels 4A and 4B. As discussed in the soil investigation reports for these parcels (BRC and ERM, 2008b, 2009b), based on the results of the investigations, data review, and a screening-level health risk assessment, exposure to residual levels of chemicals in soil at the property should not result in adverse health effects to any future on-site receptors. The NDEP agreed with this conclusion and agreed that development may proceed on the parcels without environmental restriction (NDEP, 2008, 2009b), although NDEP's "No-Further Action (NFA)" determination for the parcels was restricted to the upper 10 feet of soil, because deeper soil had not been evaluated. While the soil nonmetals detections below BCLs may potentially represent some residual impacts from past industrial use in the area, the deeper soil nonmetals detections excluded from the NFA should not prohibit the use of the proposed wells for upgradient data collection and evaluation.

2.4.5 *Metals and Nonmetals Screening Against LBCLs*

The maximum metals concentrations for samples that were collected above groundwater were compared to NDEP LBCLs (dilution-attenuation factor [DAF]-20) in accordance with NDEP guidance (NDEP, 2010). These data were also compared to the background metals datasets, and the data from AA-UW-6 were further compared to the supplemental shallow soil background dataset (ERM West, 2008). (All detected iron concentrations were lower than the 54,750-mg/kg NDEP residential soil BCL and were therefore not included in the comparison.) Table 2 lists the analytes that exceeded either the associated LBCL or background concentration.

For all borings except AA-UW-5, the maximum concentration for all of the evaluated analytes was below either the background concentration or LBCL; only one aluminum detection in AA-UW-5 exceeded both. However, aluminum has not been identified as an analyte of interest (AOI) in BRC Eastside or plants area groundwater.

For the remaining data in each boring, the detected metals concentrations that exceed background fall below LBCLs, and the detected metals concentrations that exceed LBCLs (aluminum and manganese) fall below background.

Alpha-BHC, beta-BHC, and dichloromethane (one detection in AA-UW-6) are the only nonmetals in the soil data that exceed LBCLs. As shown in Appendix C, the detected alpha-BHC and manganese concentrations are likely due to the plants area alpha-BHC impacts, which are much higher in comparison. Dichloromethane has not been identified as an AOI in BRC Eastside or plants area groundwater.

2.4.6 *Groundwater Data*

2.4.6.1 Piper and Stiff Diagrams

Piper trilinear diagrams and Stiff polygonal diagrams of major cation and anion data from the Eastside 2009 groundwater sampling event for BRC wells are provided as Figures ~~5~~ **7** through ~~8~~**10**. As shown on these figures, the ion data show that the hydrogeochemical signature of groundwater in the upgradient wells is broadly consistent with other Shallow Zone wells

screened in the same hydrogeologic unit. A relatively few Site wells, however, have a relatively distinct hydrogeochemical signature, such as off-site well PC-67 (relatively high sodium and chloride content) and well AA-18, where the ion content is relatively low. **Appendix E presents available Shallow Zone Layer 2 data from TIMET for comparison.**

An updated version of the cation-anion balance (CAB) table (with related check calculations) is provided in Appendix ~~E~~**F**. The CAB table was prepared in accordance with NDEP guidance and Standard Methods for the Examination of Water and Wastewater (Section E).

2.4.6.2 Basic Comparison Levels

All data from the groundwater samples collected from the Shallow Zone upgradient wells over the six monitoring events were compared to BCLs established by the Nevada Division of Environmental Protection (NDEP) to determine the level of chemical impact to the upgradient wells. Each of the proposed upgradient wells appear to have been impacted above the BCLs for various individual chemical constituents (Tables ~~4a~~**5a**, ~~4b~~**5b**, ~~5a~~**6a**, and ~~5b~~**6b**), including:

- 1,4-Dichlorobenzene
- Acetaldehyde
- Alpha BHC
- Arsenic
- Bromodichloromethane
- Chlorine
- Chloroform
- Chromium (VI)
- Dimethyl phosphorodithioic acid
- Fluoride
- Formaldehyde
- Iron
- Lithium
- Magnesium
- Nitrate (as N)
- Octachlorodibenzodioxin

- Perchlorate
- Phosphorus (as P)
- Tetrachloroethylene
- Thallium
- Trichloroethylene
- Uranium

Based on isoconcentration plots of chemicals presented in the monitoring reports for the six monitoring events (Appendix **G**~~F~~), the chemical distribution data appear to indicate that chemicals detected in wells AA-01 and AA-27 may be moving from off-site locations onto the Site. **Appendix G includes isoconcentration maps using available plants area data that are split into Shallow Zone Layer 1 and Shallow Zone Layer 2.**

The source of these chemicals in groundwater samples from the upgradient wells may be the historical operations in the off-site upgradient BMI Plants area. TCE was detected at less than 1 µg/L (in wells AA-01 and AA-UW-~~0~~1) in the 5th round event (Table ~~4a~~**5a**), and PCE was detected at a maximum of 84 µg/L in well AA-01 in the 5th round event (Table ~~4a~~**5a**) and at 73 µg/L in the Eastside 2009 groundwater sampling event (Table ~~5b~~**6b**).

PCE and TCE are also documented to have been released at upgradient sites to the southwest (e.g., TIMET and Tronox) (Appendix C, Figures C-12 and C-13~~) –~~**; Appendix G)**. The information in Appendix C represents a portion of the off-site source information that is fully detailed in the TIMET *Conceptual Site Model Report* (TIMET, 2007) and the Kerr-McGee (now Tronox) *Conceptual Site Model* report (ENSR, 2005). Figure**s G-3 and G-4 –are** ~~C-2 is an~~ isoconcentration plot**s** of Shallow Zone groundwater arsenic data compiled from the various sources associated with the BMI Plants area, the BRC CAMU area, and the BRC Eastside. The general spatial trends of the data for the proposed upgradient wells indicate that the concentrations are greater in wells to the south of the Site and decrease with increasing distance to the north-northeast. An exception to this spatial trend is for arsenic, where the concentration in well AA-UW-6 (102 µg/L 5th round, 161 µg/L Eastside 2009 groundwater sampling event), located to the northeast, was greater than in well AA-UW-1 (69.8 µg/L 5th round, 90.3 µg/L Eastside 2009 groundwater sampling event), located farther to the south

toward the plants area. The source of this anomaly in the data spatial trend is unknown but may be attributable to the spatial variability of the natural arsenic content of geologic materials in the Site vicinity. **Wells AA-UW-1, -2, -4, -5, and -6 are installed in Layer 2 of the Shallow Zone (screened in the TMCf only). Wells AA-01, AA-27, and AA-UW-3 are screened in Layer 1 (Qal only). Because the background metals concentrations vary by lithologic unit, metals concentrations detected in groundwater samples from the wells would be expected to be reflective of the well screen layer.**

As with wells AA-01 and AA-27 discussed above, the distribution of the data indicate that these chemicals may be moving from off-site locations onto the Site. The source of these chemicals in groundwater may be the historical operations in the BMI plants area. ~~In the case of arsenic, the BMI plants area is an off-site source.~~

2.4.6.3 Maximum Contaminant Levels

Data for groundwater samples collected from the proposed upgradient wells over the six monitoring events were compared to federal maximum contaminant levels (MCLs) (Tables ~~4b~~ **5b** and ~~5b~~**6b**) for analytes that have no BCLs. TDS, sulfate, and chloride are the primary analytes detected above secondary MCLs; aluminum, iron, and manganese were also measured over the MCL but at a much lower frequency.

TDS in monitoring wells AA-UW-4 and AA-UW-6 exceeded ten times the secondary MCL (i.e., greater than 5,000 mg/L) in the 5th round, but the Eastside 2009 groundwater sampling event data showed lower TDS concentrations (3,700 mg/L for each well). The other proposed upgradient wells also had concentrations of TDS that exceed the TDS MCL during one or more monitoring events (Tables ~~4b~~ **5b** and ~~5b~~**6b**). However, TDS concentrations are broadly consistent between sampling rounds in the proposed upgradient wells (Tables ~~4b~~ **5b** and ~~5b~~**6b**).

The groundwater data from well boring AA-UW-6 do not appear to reflect unique historical impacts from former pond use. As shown on Tables ~~5a~~ **6a** and ~~5b~~**6b**, the detected perchlorate and chlorine concentrations are among the lowest measured. ~~Chloroform was detected at its lowest concentration in well AA-UW-6, and the measured~~ **S**sulfate in well AA-UW-6 is roughly average for the proposed background wells. The TDS detection in this well, however, is among the highest TDS detections in the Shallow Zone. In addition, the arsenic was detected at 102

μg/L (5th round) and 161 μg/L (Eastside 2009 groundwater sampling event), which is the highest among the upgradient wells.

3. Summary and Conclusion

Proposed upgradient wells AA-01, AA-27, and AA-UW-1 through AA-UW-6 meet the criteria listed in Section 2 for designation as Shallow Zone upgradient wells for the Eastside area. Given the locations of the Site boundaries relative to the direction of groundwater flow and the physiographic and hydrogeologic features in the Site vicinity, there appear to be no alternative locations suitable for siting of Site upgradient wells.

Existing BRC data and modeling results that characterize groundwater flow conditions, current and historical site use, soil quality, site location, and groundwater quality support the selection of these wells for use as upgradient wells.

BRC proposes to use the data from the upgradient wells, where possible, for comparison to Site impacts and off-site impacts from the plants area and AMPAC. Appropriate data will be used as a screening tool in the BRC remedial alternatives study (RAS). If a particular analyte is detected at relatively elevated concentrations in the upgradient wells, compared to background or on-site/off-site data, then that well/analyte may be excluded from further analysis if the impacts are determined to be due to past BRC Site operations. However, that same well can still be used for data comparisons and decision-making for other analytes detected at relatively low concentrations compared to background or on-site/off-site impacts.

References

Basic Remediation Company (BRC), Environmental Resources Management (ERM), and Daniel B. Stephens & Associates, Inc. (DBS&A). 2007. *Closure plan, BMI Common Areas, Clark County, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. May 2007.

Basic Remediation Company (BRC) and Environmental Resources Management (ERM. 2008a. *Data validation summary report for the upgradient well installation investigation, July-August 2007 (Dataset 47), BMI Common Areas (Eastside), Clark County, Nevada.* February 2008.

BRC and ERM. 2008b. *Technical memorandum: Data review for 2007 Parcel 4A investigation, BMI Common Areas (Eastside), Clark County, Nevada.* Revision 2. March 12, 2008.

BRC and ERM. 2009a. *2008 Deep soil background report, BMI Common Areas (Eastside), Clark County, Nevada.* October 2009.

BRC and ERM. 2009b. *Technical memorandum: Data review for the Parcel 4B investigation, BMI Common Areas (Eastside), Clark County, Nevada.* Revision 5. October 23, 2009.

Converse. 2009. Eastside water level data, BRC Common Areas, Eastside. August 2009.

Daniel B. Stephens & Associates, Inc. (DBS&A). 2009~~a~~. *Updated groundwater flow model calibration, BMI Upper and Lower Ponds area.* Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. May 14, 2009.

DBS&A. ~~2009b~~**2010**. *Evaluation of hydrogeologic zone connectivity through tritium and stable isotope sampling and analysis, BMI Common Areas (Eastside), Clark County, Nevada.* Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. **April 21, 2010.**~~December 29, 2009~~.

ENSR International (ENSR). 2005. *Conceptual site model, Kerr-McGee facility, Henderson, Nevada.* Document Number 04020-023-100. Prepared for Kerr-McGee Chemical LLC. February 2005.

ERM West, Inc. 2009. 2008 *Supplemental shallow soil background report* (rev 6). Prepared for Basic Remediation Company; Submitted to Nevada Division of Environmental Protection. September 2009.

Montgomery Watson Harza (MWH). 2006. *Data validation summary report for the 2004 hydrogeologic characterization (dataset 27), BMI Common Areas (Eastside), Clark County, Nevada.* May 2006.

MWH. 2008. *Fifth round groundwater monitoring report, April - July 2008, BMI Common Areas (Eastside), Clark County, Henderson, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. December 2008.

Neptune and Company. 2007. Guided interactive statistical decision tools (GISdT). <www.gisdt.org>.

Nevada Division of Environmental Protection (NDEP). 2008. Response to: *Technical memorandum – Data review for 2007 Parcel 4A investigation* dated March 12, 2008, and *Errata pages for Technical memorandum – Data review for 2007 Parcel 4A investigation* dated May 2, 2008, NDEP Facility ID# H-000688. May 15, 2008.

NDEP. 2009a. *Significance levels for the Gilbert toolbox of background comparison tests, BMI plant sites and common areas projects, Henderson, Nevada.* July 2009.

NDEP. 2009b. Response to: *Technical memorandum – Data review for Parcel 4B investigation* dated October 23, 2009, NDEP Facility ID# H-000688. November 12, 2009.

NDEP. 2010. *Attachment A: Further evaluation of soil leaching to groundwater.* Available at <http://ndep.nv.gov/bmi/docs/100116%20leaching_guidance.pdf> January 16, 2010.

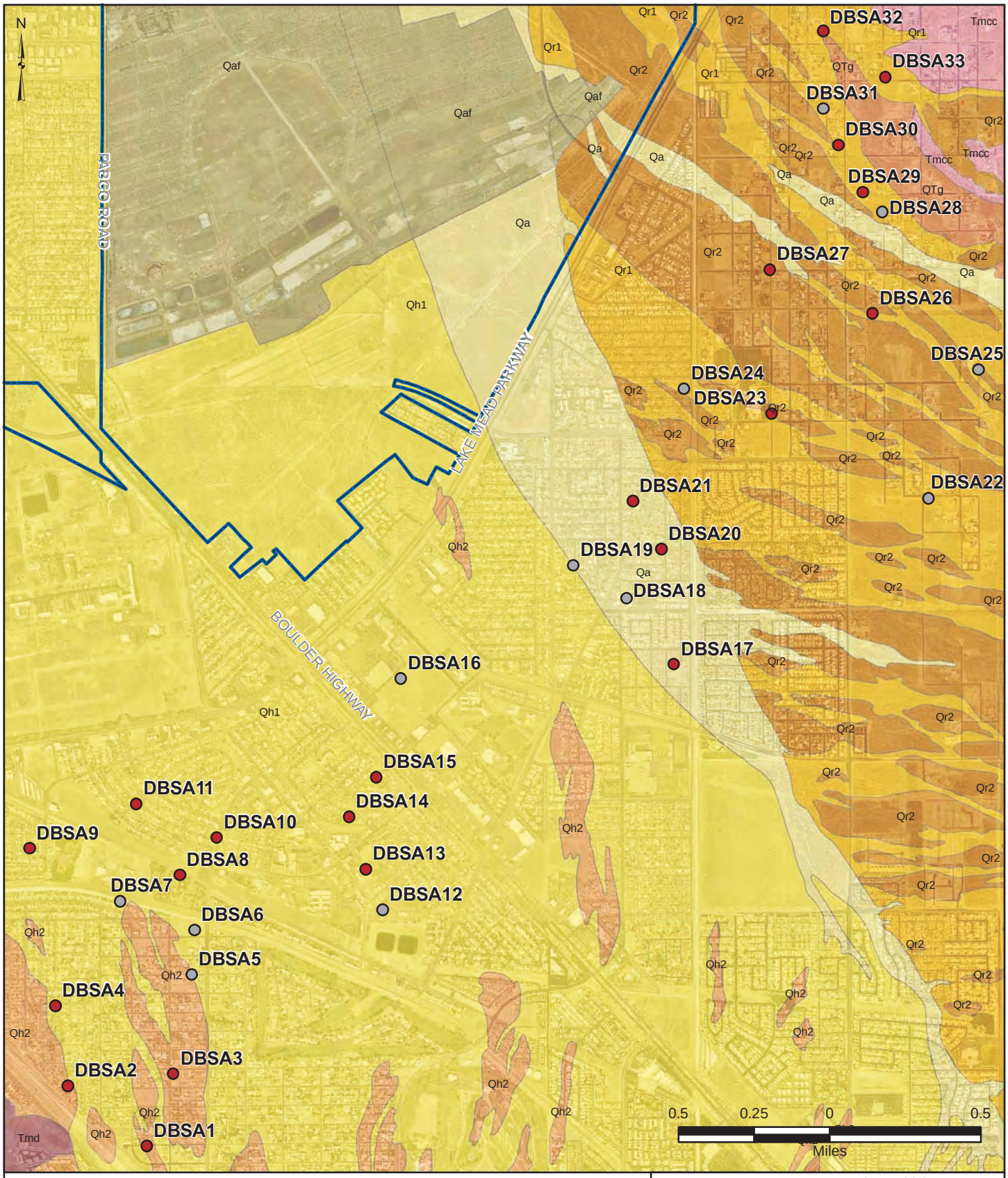
Titanium Metals Corporation (TIMET). 2007. *Conceptual site model, Titanium Metals Corporation Facility, Henderson, Nevada.* April 25, 2007.

TIMET. 2009. TIMET water level data, 2009 routine events and recent extraction well data, January to December 2009.

Veolia. 2009. Tronox depth to water, September, October, and November 2009.

Appendix B

Background Boring Locations and Upgradient Well Boring Logs with Well Construction Data



Site AOC3 Boundary

Deep Background Sample Location

- Boring Location
- Boring Location not Used

Lithology

Qa	Qr2
Qaf	QTg
Qh1	Tmcc
Qh2	Tmd
Qr1	

Fall 2006 Aerial Photo.

BMI Common Areas (Eastside)
Clark County, Nevada

FIGURE B-1

2008 DEEP BACKGROUND SAMPLE LOCATIONS

Basic Remediation COMPANY

Prepared by MKJ (ERM) | Date 06/18/09 | JOB No. 0064276 | FILE: GIS/BRC/DEEP-BACKGROUND_FIGURE1.MXD

Log of Boring No. BRC-SB-01-A

BMI Site - Hydrogeologic Characterization

Henderson, Nevada

Drilling Method: Mud Rotary
Drilling Equipment: Gefco 15K
Drilling Contractor: Water Development Corporation
Driller: Juan Aguilar

Borehole Total Depth: 400 ft bgs
Borehole Diameter: 10 in
Boring Location: Location 1 (Well ID: AA-01)
Depth to Water (ft. bgs): NA ▽

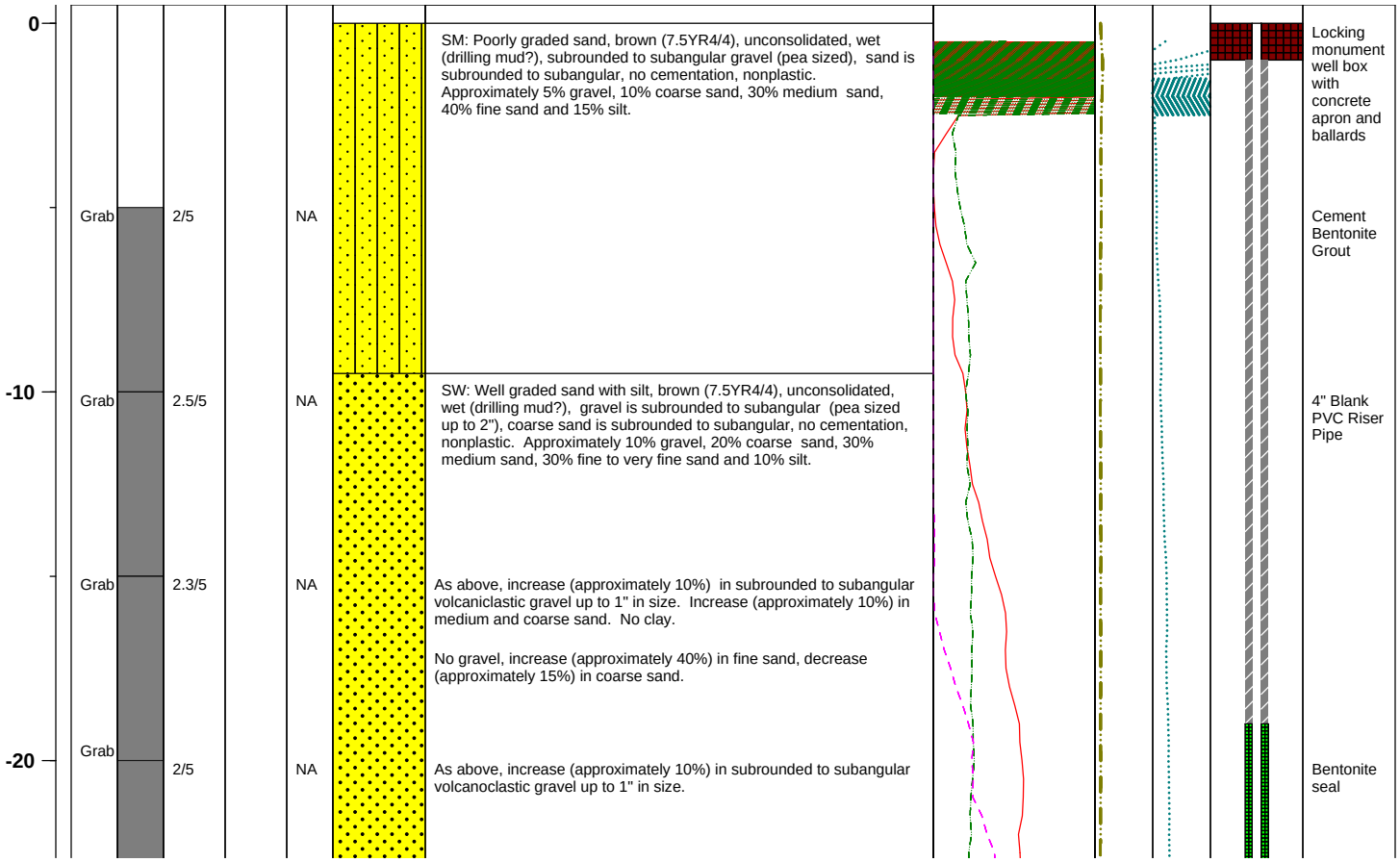
Sample Type: Continuous Core
Sample Interval Continuous

Logged By: Dave Kremer
Date Started: 2/21/04
Date Completed: 2/23/04

Monitoring Well Construction

Type of Surface Seal:	Bentonite-Grout	**Screen Slot Size:**	0.010 in
Blank Casing Type/Size:	4" Sch 80 PVC	**Top of Screen (ft. bgs):**	29 ft bgs
Screen Type/Size:	4" Sch 80 PVC	**Bottom of Screen (ft. bgs):**	49 ft bgs
Transition Sand Type:	#1C	**Type of Sand Pack:**	#10 x 20

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	E-Log: 64" (OHM)	E-Log: S. PT. (OHM)	Caliper Log (inch)	Guard Log (OHM.M)	Well Construction
0	Grab	2/5			NA		SM: Poorly graded sand, brown (7.5YR4/4), unconsolidated, wet (drilling mud?), subrounded to subangular gravel (pea sized), sand is subrounded to subangular, no cementation, nonplastic. Approximately 5% gravel, 10% coarse sand, 30% medium sand, 40% fine sand and 15% silt.						Locking monument well box with concrete apron and ballards
-10	Grab	2.5/5			NA		SW: Well graded sand with silt, brown (7.5YR4/4), unconsolidated, wet (drilling mud?), gravel is subrounded to subangular (pea sized up to 2"), coarse sand is subrounded to subangular, no cementation, nonplastic. Approximately 10% gravel, 20% coarse sand, 30% medium sand, 30% fine to very fine sand and 10% silt.						Cement Bentonite Grout
	Grab	2.3/5			NA		As above, increase (approximately 10%) in subrounded to subangular volcaniclastic gravel up to 1" in size. Increase (approximately 10%) in medium and coarse sand. No clay. No gravel, increase (approximately 40%) in fine sand, decrease (approximately 15%) in coarse sand.						4" Blank PVC Riser Pipe
-20	Grab	2/5			NA		As above, increase (approximately 10%) in subrounded to subangular volcanoclastic gravel up to 1" in size.						Bentonite seal



Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log 16" (OHM)	E-Log 64" (OHM)	E-Log S. PT. (OHM)	Caliper Log (inch)	Guard Log (OHM.M)	Well Construction
	Grab		3/5				SM: Poorly graded silty sand, brown (7.5YR4/4), wet (drilling mud?), subrounded to subangular volcanoclastic gravel (pea sized up to 1 1/2-in in size), sand is subrounded, no clay, no cementation, nonplastic, unconsolidated. Approximately 10% gravel, 25% coarse sand, 25% medium sand, 30% fine sand and 15% silt.						#1C Transition Sand
-30	Grab		3/5		NA		SP-SM: Sand with silt, brown (7.5YR4/4), wet (drilling mud?), subrounded volcanoclastic gravel (pea sized up to 1" in size), subrounded sand, no clay, no cementation, nonplastic, unconsolidated. Approximately 10% gravel, 15% coarse sand, 35% medium sand, 30% fine sand and 10% silt.						#10 x 20 Sand Pack
	Grab		3/5		NA		As above, slightly moist, increase in sand. Approxmately 10% gravel, 15% coarse sand, 30% medium sand, 40% fine sand and 5% silt.						4" 0.010 Slot PVC screen
							As above.						
-40	Grab		1/5		NA		As above, increase in gravel and sand. Approximately 20% gravel, 30% coarse sand, 40% medium sand and 10% fine sand.						
	Grab		1/5		NA		As above, increase in sand, decrease in gravel (up to 2" in size). Approximately 15% gravel, 25% coarse sand, 30% medium sand, 25% fine sand and 5% silt.						
-50	Grab		5/5		NA		ML: Silt, brown (7.5YR5/4), soft, moist, sand is very fine grained, trace clay, weak to no cementation, nonplastic. Approximately 5% fine sand, 90% silt and 5% clay.						Threaded PVC Well Base Cap #10 x 20 Sand Pack Basal Bentonite Seal

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
	Grab		5/5		NA		As above.						
							As above, slight (approximately 5%) increase in fine sand, non-plastic to low plasticity.						
-60	Grab		5/5		NA		As above.						
							As above.						
	Grab		5/5		NA		As above.						Cement Backfill
							As above.						
-70	Grab		5/5		NA								
							As above, medium stiff, moist, trace clay, medium (1/8" to 1" in size) cemented nodules, nonplastic.						
	Grab		1/5		NA		No recovery from 73 to 76 ft bgs.						
							Silt, brown (7.5YR5/4), soft, moist, sand is very fine grained, trace clay, no cementation, low plasticity. Approximately 10% sand, 85% silt and 5% clay.						
-80	Grab		5/5		NA		As above, slight (approximately 5%) increase in fine to very fine sand, moist.						
							As above, wet, increase (approximately 10%) in very fine sand.						
	Grab		5/5		NA								

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. P. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
-90	Grab		5/5		NA		As above, moist, decrease (approximately 10%) in very fine sand.						
							As above, increase (approximately 10%) in very fine to fine sand.						
							As above, decrease (approximately 5%) in very fine sand.						
	Grab		5/5		NA		As above, decrease (approximately 5%) in very fine sand.						
							As above.						Cement Backfill
							As above.						
-100	Grab		5/5		NA		As above.						
							As above.						
	Grab		5/5		NA		As above.						
							As above.						
-110	Grab		5/5		NA		As above.						
							As above, decrease (approximately 5%) in very fine sand, increase in density to stiff.						
	Grab		5/5		NA								

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. P. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
-120	Grab		5/5		NA		As above, increase (approximately 15%) in very fine sand, decrease in density to soft, wet.						
							Silt with sand, as above, decrease (approximately 15%) in very fine sand, increase in density to stiff.						
	Grab		5/5		NA		Silt, as above.						
-130	Grab		5/5		NA								Cement Backfill
							As above, decrease (approximately 5%) in very fine sand, increase in density to very stiff.						
	Grab		5/5		NA								
							As above, increase (approximately 5%) in very fine sand.						
							Silt with clay, as above, decrease (approximately 5%) in very fine sand.						
-140	Grab		5/5		NA								
							Silty with sand and clay, as above.						
							Silt with clay, as above, decrease (approximately 10%) in very fine sand.						
	Grab		4/5		NA								
							Clayey silt, as above.						

BMI Site - Hydrogeologic Characterization

Henderson, Nevada

Basic Remediation COMPANY

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
-150	Grab		5/5		NA								
	Grab		5/5		NA		Silt with sand and clay, as above, increase (approximately 10%) in very fine sand.						Cement Backfill
							Silt with clay, as above, decrease (approximately 5%) in very fine sand.						
-160	Grab		5/5		NA								
							Silt with sand and clay, as above, increase (approximately 10%) in very fine sand.						
	Grab		5/5		NA		Silt with clay, as above, decrease (approximately 10%) in very fine sand.						
							Clayey silt, as above.						
-170	Grab		5/5		NA								
	Grab		5/5		NA								
-180							CL: Silty clay, brown (7.5YR4/4), hard, moist, sand is very fine grained, silt with clay, no cementation, moderate to high plasticity.						

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
	Grab		5/5		NA		Approximately 5% fine sand, 45% silt and 50% clay.						
	Grab		5/5		NA		ML: Clayey silt, brown (7.5YR5/3), very stiff, moist, sand is very fine grained, silt and clay, no cementation, low plasticity. Approximately 5% fine sand, 55% silt and 40% clay.						
							CL: Silty clay, pinkish gray (7.5YR7/2), very stiff, moist, coarse, medium and fine sands are gypsum fragments, silt and clay, no cementation, moderate plasticity. Trace coarse sand, 5% medium sand, 15% fine sand, 30% silt and 50% clay.						
-190	Grab		5/5		NA		ML: Clayey silt, pinkish gray (7.5YR6/2), very stiff, moist, sand is very fine grained, silt and clay, no cementation, low plasticity. 5% coarse sand, 5% medium sand, 10% fine sand, 50% silt and 30% clay.						Cement Backfill
							Silt with sand and clay, color change to white (10YR8/1), very stiff, some cemented very fine sand nodules, no cementation, non plastic.						
	Grab		5/5		NA								
							Clayey silt with sand, as above, decrease (appproximately 10%) in medium sand.						
-200	Grab		5/5		NA								
							Clayey silt, as above.						
	Grab		5/5		NA								Cement Backfill
							Color change to greenish gray (Gley 1 6/10Y), hard.						
-210	Grab		5/5		NA								

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
							Color change to brown (10YR5/3), hard.						
	Grab		5/5		NA		Color change to brown (7.5YR4/3).						
							Color change to brown (7.5YR5/3).						
-220	Grab		5/5		NA		SM: Poorly graded silty sand with clay, brown (7.5YR5/3), hard, moist, medium grained sand subrounded, fine to very fine sand, silt with clay, no cementation, nonplastic. Approximately 5% medium sand, 50% fine sand, 40% silt and 5% clay.						
							ML: Clayey silt, brown (7.5YR5/3), hard, moist, very fine sand, silt and clay, no cementation, nonplastic to low plasticity. Approximately 5% fine sand, 70% silt and 25% clay.						
	Grab		5/5		NA								
							As above, slight increase (approximately 5%) in clay.						
-230	Grab		5/5		NA		As above.						
							Color change to pinkish gray (7.5YR7/2), hard, moist, sand is fine to very fine grained, silt and clay, nocementation, increase (approximately 5%) in fine sand, decrease in clay.						
	Grab		5/5		NA		Color change to brown (7.5YR5/3), moderate plasticity, increase (approximately 5%) in fine sand, decrease in clay.						
							As above, decrease (approximately 5%) in fine sand, increase in clay.						
-240	Grab		5/5		NA		Clayey silt with sand, as above, increase (approximately 15%) in fine sand.						

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
	Grab		5/5		NA		As above, decrease (approximately 10%) in fine sand.						Cement Backfill
							Silt with clay, as above.						
-250	Grab		5/5		NA		As above, decrease (approximately 5%) in fine sand.						
							Clayey silt, as above, increase (approximately 5%) in fine sand.						
	Grab		5/5		NA		Clayey silt with sand, as above.						Cement Backfill
-260	Grab		5/5		NA		Silt with clay, as above, increase (approximately 10%) in fine sand, decrease in clay.						
							As above, increase (approximately 5%) in fine sand, decrease in clay.						
	Grab		5/5		NA		Clayey silt, as above, decrease (approximately 10%) in fine sand.						
-270	Grab		5/5		NA								
							Silt with sand and clay, as above, increase (approximately 10%) in fine						

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. P.T. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
	Grab		0/5		NA		sand.						
-280	Grab		5/5		NA		Clayey silt, as above, decrease (approximately 5%) in fine sand.						
							Silt with sand, as above.						
	Grab		5/5		NA		Sandy silt, as above, increase (approximately 20%) in fine sand.						
							Clayey silt, as above, increase (approximately 15%) in silt, trace fine sand.						
-290	Grab		5/5		NA								
							As above, increase (approximately 10%) in fine sand.						
							Silt with sand, as above. Approximately 15% fine sand, 80% silt and 5% clay.						
	Grab		5/5		NA								Cement Backfill
-300	Grab		5/5		NA		Silt, as above. Approximatley 10% fine sand, 85% silt and 5% clay.						
			5/5		NA								

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. P. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
-310	Grab		5/5		NA		SM: Poorly graded silty sand, brown (7.5YR4/4), hard, moist to wet, medium grained subrounded sand, some fine to very fine sand, silt with no clay, no cementation, nonplastic. Trace coarse sand, 10% medium sand, 60% fine sand and 30% silt.						
							ML						
							SM: Poorly graded silty sand, brown (7.5YR4/4), hard, very moist, medium subrounded sand, sand is very fine to fine grained, no cementation, nonplastic. Approximately 10% medium sand, 50% fine sand and 40% silt.						
	Grab		5/5		NA		ML: Sandy silt, brown (7.5YR4/4), hard, moist, some medium grained subrounded sand, some fine to very fine grained sand, no cementation, no to low plasticity.						Cement Backfill
-320	Grab		5/5		NA		SM: Poorly graded silty sand, brown (7.5YR4/4), stiff, very moist to wet, some coarse subrounded sand, some medium subrounded sand, some fine to very fine sand, none to weak cementation, nonplastic. Approximately 5% coarse sand, 10% medium sand, 50% fine sand and 35% silt.						
							ML: Sandy wilt with clay, brown (7.5YR4/4), hard, moist, trace subrounded medium sand, some fine to very fine sand, silt with clay, no cementation, low to nonplastic. Trace medium sand, 45% fine sand, 50% silt and 5% clay.						
	Grab		5/5		NA		SM: Silty sand, brown (7.5YR4/4), stiff, very moist, some medium grained subrounded sand, some fine to very fine grained sand, silt with trace clay at 325 ft bgs, no to weak cementation, nonplastic. Approximately 5% medium sand, 50% fine sand and 45% silt.						
							ML						
							CL: Silty clay, light brown (7.5YR6/4), hard, moist to dry, trace very fine grained sand, silt and clay, no cementation, moderate plasticity. Trace fine to very fine grained sand, 40% silt and 60% clay.						
-330	Grab		5/5		NA		ML						
							CH: Clay with silt, light brown (7.5YR6/3), hard, moist to dry, no cementation high plasticity. Approximately 10% silt and 90% clay.						
							CL: Silty clay, brown (7.5YR5/3), hard, moist, silt and clay, no cementation, low to moderate plasticity. Approximately 5% very fine sand, 30% silt and 65% clay.						
	Grab		5/5		NA		ML: Clayey silt, brown (7.5YR5/3), hard, moist, silt and clay, no cementation, low to moderate plasticity. Approximately 70% silt and 30% clay.						
							CL: Silty clay, brown (7.5YR5/3). Approximately 30% silt and 70% clay.						

Log of Boring No. BRC-SB-01-A

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log 16" (OHM)	E-Log 64" (OHM)	E-Log S. PT. (OHM)	Caliper Log (inch)	Guard Log (OHM.M)	Well Construction
-340	Grab		5/5		NA		ML: Clayey silt, brown (7.5YR5/3). Approximately 60% silt and 40% clay..						
							CL: Silty clay, brown (7.5YR5/3). Approximately 40% silt and 60% clay.						
							SM: Poorly graded silty sand, brown (7.5YR4/3), soft, very moist to wet, sand is prediominately fine grained, silt, no clay, no cementation, nonplastic. Approximately 80% fine to very fine sand and 20% silt.						
							ML: Poorly graded clayey silt, brown (7.5YR4/3), soft, very moist to wet, no cementation, nonplastic. Approximately 60% silt and 40% clay.						
	Grab		5/5		NA		CL: Approximately 10% silt, 90% clay.						
							ML: Silt with clay, brown (7.5YR4/4), hard, moist, sand is fine to very fine grained, no cementation, nonplastic. Approximately 10% fine to very fine sand, 85% silt and 5% clay.						
							SM: Silty sand, brown (7.5YR4/4). Approximately 10% medium sand, 70% fine sand and 20% silt.						
-350							ML: Sandy silt with clay, brown (7.5YR4/4). Approximately 15% fine sand, 85% silt and trace clay..						
	Grab		5/5		NA		SM: Poorly graded silty sand, brown (7.5YR5/3), very stiff, moist to wet, some medium grained subrounded sand, silt with trace clay, no cementation, low plasticity. Approximately 30% medium sand, 50% fine sand and 20% silt.						
							ML: Clayey silt with sand, brown (7.5YR5/3). Approximately 5% fine sand, 50% silt and 45% clay.						
							SM: Poorly graded silty sand, brown (7.5YR5/3). Approximately 10% medium sand, 50% fine sand, 40% silt and trace clay.						
	Grab		5/5		NA		ML: Clayey silt, brown (7.5YR5/3), hard, moist, sand is fine to very fine grained, silt and clay, no cementation, low plasticity. Approximately 35% fine to very fine sand, 50% silt and 5% clay.						Cement Backfill
							SM: Poorly graded silty sand, brown (7.5YR5/3). Approximately 5% medium sand, 60% fine sand and 35% silt.						
							ML: Clayey silt, brown (7.5YR5/3). Approximately 10% fine to very fine sand, 70% silt and 20% clay.						
-360	Grab		5/5		NA		CL: Silty clay, light brown (7.5YR6/3). Approximately 20% silt and 80% clay.						
							ML: Clayey silt, brown (7.5YR5/3). Approximately 30% fine sand, 60% silt and 10% clay.						
							CL: Silty clay, light brown (7.5YR6/3), hard, moist, silt and clay with trace gypsum fragments up to 1/4", no cementation, moderate plasticity. Trace coarse sand, 20% silt and 80% clay.						
	Grab		5/5		NA		SM: Silty sand, brown (7.5YR4/4), very stiff, moist, medium grained subrounded sand, some fine to very fine grained sand, no clay, no to weak cementation, nonplastic. Approximately 10% medium sand, 70% fine sand and 20% silt.						
							ML: Clayey silt, brown (7.5YR4/4), hard, moist, some very fine grained sand and silt and clay, no cementation, low plasticity. Approximately 10% fine sand, 70% silt and 20% clay.						

BMI Site - Hydrogeologic Characterization

Henderson, Nevada

Log of Boring No. BRC-SB-01-A

Basic Remediation COMPANY

Depth Elevation (BGS)	Sample Type	Sample Interval	Sample Recovery	Sample Retained for Analysis	PID	Lithology	Soil Description	Geophysical Data: E-Log: 16" (OHM)	Geophysical Data: E-Log: 64" (OHM)	Geophysical Data: E-Log: S. PT. (OHM)	Geophysical Data: Caliper Log (inch)	Geophysical Data: Guard Log (OHM.M)	Well Construction
-370	Grab		4/5		NA		CL: Silty clay, brown (7.5YR5/3), hard, moist, silt and clay, no cementation, moderate plasticity. Approximately 10% fine sand, 60% silt and 30% clay.						
							ML: Clayey silt, brown (7.5YR4/4). Approximately 10% fine sand, 60% silt and 30% clay.						
							CL: Silty clay, brown (7.5YR5/3), hard, moist, silt and clay, no cementation, moderate plasticity. Approximately 5% fine sand, 40% silt and 55% clay.						
	Grab		5/5		NA		ML: Silt with clay, brown (7.5YR4/4), hard, moist, sand is fine to very fine grained, silt with clay, no cementation, no to low plasticity. Approximately 10% fine sand, 80%, silt and 10% clay.						Cement Backfill
							Clayey silt, as above. Approximately 10% fine sand, 50% silt and 40% clay.						
-380	Grab		5/5		NA		Silt with clay, as above. Approximately 10% fine sand, 80% silt and 10% clay.						
	Grab		5/5		NA		Clayey silt, as above. Approximately 80% silt and 20% clay.						Cement Backfill
							Wet from 386.5 to 386.7 ft bgs.						
-390	Grab		5/5		NA		Silt with clay, as above. Appoximately 5%fine sand, 85% silt and 10% clay.						
							Clayey silt, as above. Approximately 80% silt and 20% clay.						
	Grab		5/5		NA		Silt, as above. Approximately 5% fine sand, 90% silt and 5% clay.						
							Silt with clay, as above. Approximately 5% fine sand, 90% silt and 5% clay.						
-400													

Log of Boring No. BRC-SB-27-B

BMI Site - Hydrogeologic Characterization

Henderson, Nevada

Drilling Method: Sonic
Drilling Equipment: Rotary Sonic
Drilling Contractor: Resonant Sonic
Driller: ProSonic

Borehole Total Depth: 143 ft bgs
Borehole Diameter: 8.5 in
Boring Location: Location 27 (Well ID: AA-27)
Depth to Water (ft. bgs): NA ▽

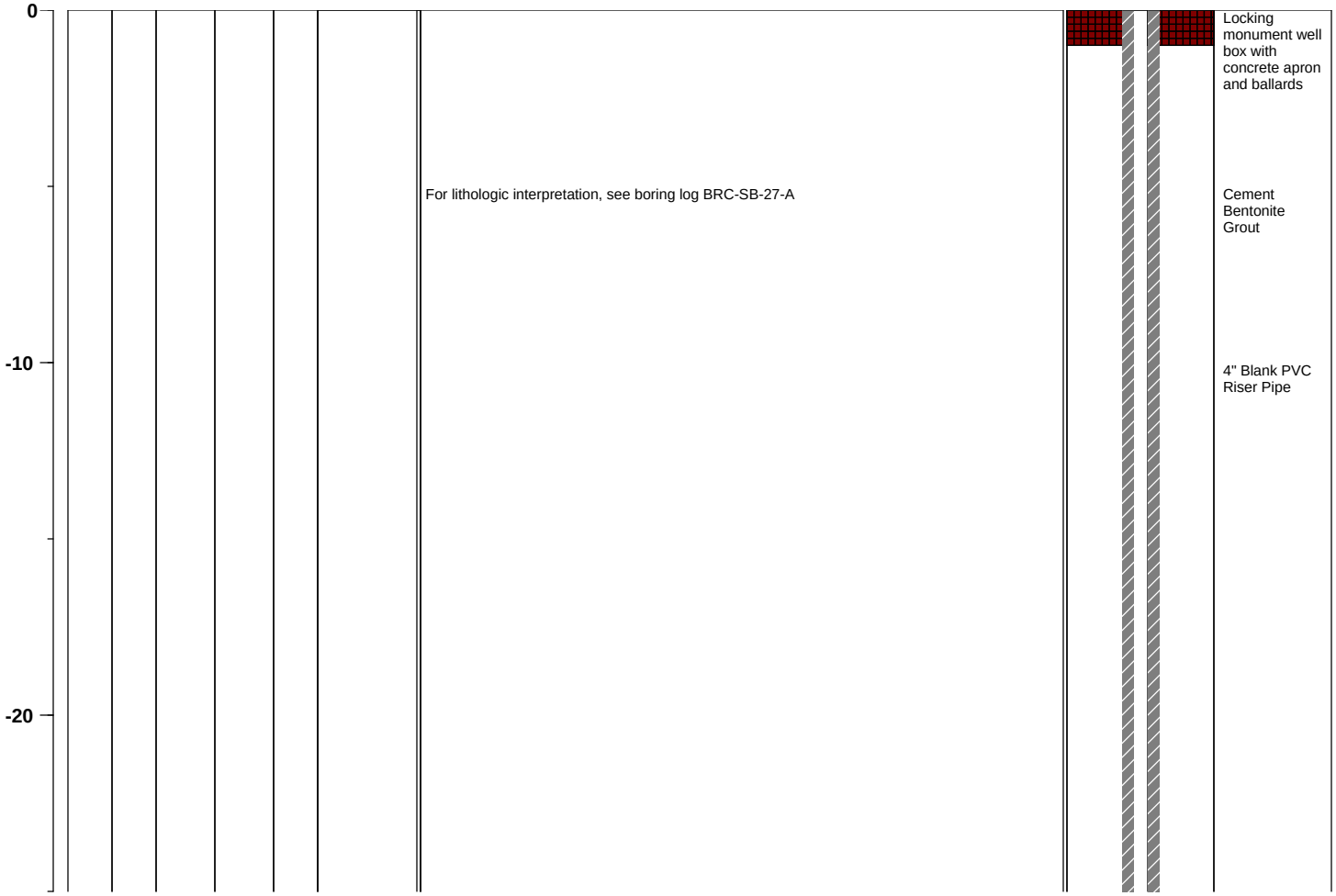
Sample Type: S.S.
Sample Interval Continuous

Logged By: Jennifer Wiley
Date Started: 07/06/04
Date Completed: 07/07/04

Monitoring Well Construction

Type of Surface Seal:	Bentonite-Grout	**Screen Slot Size:**	0.010 in
Blank Casing Type/Size:	4" Sch 80 PVC	**Top of Screen (ft. bgs):**	61.5 ft bgs
Screen Type/Size:	4" Sch 80 PVC	**Bottom of Screen (ft. bgs):**	81.5 ft bgs
Transition Sand Type:	N/A	**Type of Sand Pack:**	#2 x 12

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction



Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
-30							For lithologic interpretation, see boring log BRC-SB-27-A	Cement Bentonite Grout 4" Blank PVC Riser Pipe
-40								
-50								Bentonite seal

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
-60							For lithologic interpretation, see boring log BRC-SB-27-A	#10 x 20 Sand Pack 4" 0.010 Slot PVC screen
-70								
-80								Threaded PVC Well Base Cap Cement Backfill
-90								

Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
-100							For lithologic interpretation, see boring log BRC-SB-27-A	Cement Backfill
-110								
-120								

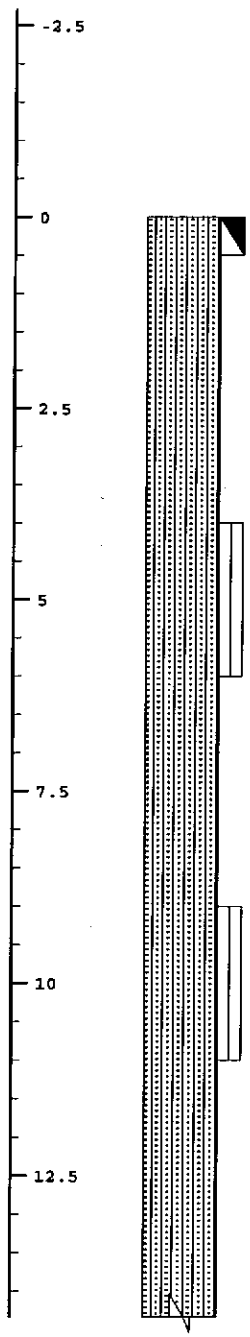
Depth Elevation (MSLD)	Sample Type	Sample Interval	Sample Recovery (feet)	Sample Retained for Analysis	PID	Lithology	Soil Description	Well Construction
-130							For lithologic interpretation, see boring log BRC-SB-27-A	Cement Backfill
-140								

EXPLORATION LOG
AA-UW 1

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26725562.64, E 839434.53
EXPLORATION DATE: 7/30/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 48.70'
DATE MEASURED: 8/1/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		SM	Grayish brown silty SAND, little gravel, dry and dense. PIDs (10.6 & 11.7 eV)= 0. 1, 0.0 ppmV. 25% angular gravel, 70% subrounded sand, 5% fines; Trace mica; poorly sorted with feldspars and pyroxene.						
2.5									
5			...light brown. PIDs (10.6 & 11.7 eV)= 0. 1, 0.0 ppmV.						
7.5									
10			...reddish brown. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
12.5									



The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 1

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26725562.64, E 839434.53
EXPLORATION DATE: 7/30/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 48.70'
DATE MEASURED: 8/1/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15									
17.5			...weakly cemented. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
20			...uncemented. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
22.5									
25									
27.5									
30			...PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 1

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26725562.64, E 839434.53
EXPLORATION DATE: 7/30/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 48.70'
DATE MEASURED: 8/1/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
32.5									
35			...trace gravel.						
37.5									
40			...weakly cemented layers inches thick alternating with uncemented layers to 46 feet bgs. PIDs (10.6 & 11.7 eV)= 0. 1, 0.0 ppmV.						
42.5									
45			...brown. ...dark reddish brown, moist, weakly cemented.						
47.5		SC	Dark reddish brown clayey SAND with gravel, wet and medium dense.						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 1

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26725562.64, E 839434.53
EXPLORATION DATE: 7/30/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 48.70'
DATE MEASURED: 8/1/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
			...strong brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
		CL	MUDDY CREEK FORMATION: Yellowish red sandy lean CLAY, wet and very stiff. Occasional thin (1/2 inch thick) sandstone layers. 5% subangular gravel, 10% subangular sand, 85% fines; <1% micas; poorly sorted with feldspar and pyroxene.						
			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
		GP-GC	Dark brown poorly graded GRAVEL with sand, trace clay, moist and medium dense.						
			END OF TEST PIT AT 65.0 FEET						

50
52.5
55
57.5
60
62.5
65

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 2

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26722943.77, E 838125.09
EXPLORATION DATE: 7/31-8/3/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 64.57'
DATE MEASURED: 8/4/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		GW	Light grayish brown well graded GRAVEL with silt and sand, dry and medium dense. PIDs (10.6 & 11.7 eV)= 0. 7, 0.1 ppmV. 55% angular to subangular gravel, 405 subanular sand, 5% fines; <1% mica; poorly sorted with feldspar, amphiboe, and pyroxene.						
2.5		SM	Reddish brown silty SAND with gravel, dry and dense.						
5			...PIDs (10.6 & 11.7 eV)= 0. 9, 0.1 ppmV. 5% angular gravel, 85% subrounded to subangular sand, 10% fines; <1% mica, poorly sorted.						
7.5									
10			...PIDs (10.6 & 11.7 eV)= 0. 3, 0.1 ppmV.						
12.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 2

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26722943.77, E 838125.09
EXPLORATION DATE: 7/31-8/3/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 64.57'
DATE MEASURED: 8/4/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15			...brown.						
17.5			...weakly cemented to 20 feet.						
20			...uncemented. Increasing gravel size to 2 inches. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
22.5									
25			...pale brown.						
27.5									
30		GW	Light brown well graded GRAVEL with silt and sand, few cobbles, dry and very dense. ...PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV. 50%						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 2

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26722943.77, E 838125.09
EXPLORATION DATE: 7/31-8/3/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 64.57'
DATE MEASURED: 8/4/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
			angular gravel, 40% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted withfeldspar and pyroxene.						
32.5									
35		SM	Light brown silty SAND, trace gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV. 7% subangular gravel, 90% subrounded to subangular sand, 3% fines; <1% mica; poorly sorted with feldspar and pyroxene.						
37.5									
40			...PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
42.5			...weakly cemented to 45 feet.						
45			...uncemented.						
47.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 2

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26722943.77, E 838125.09
EXPLORATION DATE: 7/31-8/3/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 64.57'
DATE MEASURED: 8/4/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
			...weakly cemented to 50 feet.						
50		GW	Brown well graded GRAVEL with silt and sand, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 50% subangular to angular gravel, 40% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspar and pyroxene.						
52.5			...moist.						
55		SM	Reddish brown silty SAND with gravel, moist and very dense. Weakly cemented layers 0.5 to 1.0 inch thick. 20% angular gravel, 70% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted with feldspar, pyroxene, and trace gypsum.						
57.5									
60			...dark brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
62.5		CL	MUDDY CREEK FORMATION: Yellowish red sandy lean CLAY, moist and very stiff. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 5% angular to subangular gravel, 15% subrounded sand, 85% fines; <1% mica; poorly sorted course fraction (sand and gravel).						

EXPLORATION LOG
AA-UW 2

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26722943.77, E 838125.09
EXPLORATION DATE: 7/31-8/3/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 64.57'
DATE MEASURED: 8/4/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
65									
67.5									
70			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
72.5									
75			END OF TEST PIT AT 75.0 FEET						
77.5									
80									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 3

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26720040.77, E 836519.18
EXPLORATION DATE: 8/5/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 63.89'
DATE MEASURED: 8/6/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		SM	Light brown silty SAND with gravel, dry and dense. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 10% angular to subangular gravel, 80% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspar and mafic minerals (pyroxene).						
2.5									
5			...PIDs (10.6 & 11.7 eV)= 0.1, 0.0 ppmV.						
7.5									
10		GW	Brown well graded GRAVEL with silt and sand, dry and very dense. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV. 60% angular to subangular gravel, 30% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted withfeldspar and mafic minerals (pyroxene).						
12.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

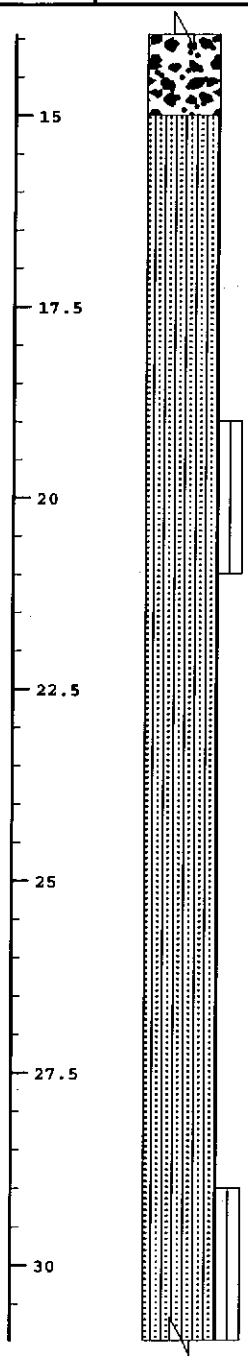
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 3

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26720040.77, E 836519.18
EXPLORATION DATE: 8/5/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 63.89'
DATE MEASURED: 8/6/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15		SM	Brown silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV. 15% angular to subangular gravel, 75% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspar and mafic minerals (pyroxene).						
17.5									
20			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
22.5									
25			...light brown, few cobbles.						
27.5									
30			...few cobbles. PIDs (10.6 & 11.7 eV)= 0.2, 0.0 ppmV.						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 3

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26720040.77, E 836519.18
EXPLORATION DATE: 8/5/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 63.89'
DATE MEASURED: 8/6/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
32.5									
35			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
			...yellowish red ...weakly cemented to 40.0 feet.						
37.5									
40			...PIDs (10.6 & 11.7 eV)= 0. 0, 0.0 ppmV.						
42.5									
45									
47.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

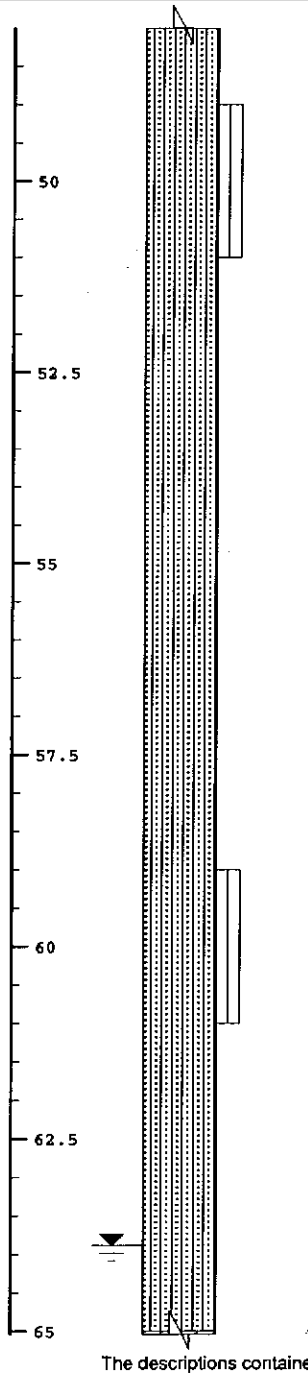
Figure No.

EXPLORATION LOG
AA-UW 3

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26720040.77, E 836519.18
EXPLORATION DATE: 8/5/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 63.89'
DATE MEASURED: 8/6/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
50			...weakly cemented layers 0.5 inch thick. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 20% subangular to angular gravel, 65% subrounded sand, 15% fines; <1% mica; poorly sorted with feldspar.						
52.5			...moist						
55									
57.5									
60			...dark brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
62.5									
65									



The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 3

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26720040.77, E 836519.18
EXPLORATION DATE: 8/5/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 63.89'
DATE MEASURED: 8/6/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
67.5		CL	MUDDY CREEK FORMATION: Reddish brown sandy lean CLAY, wet and very stiff. <1% angular gravel, 5% subrounded sand, 94% fines; <1% mica; poorly sorted course fraction (sand and gravel),						
70			...moist. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
72.5									
75									
77.5		SP	Dark brown poorly graded SAND, trace gravel, wet and very dense. <1% subangular gravel, 5% subrounded sand, 95% fines; <1% mica; poorly sorted course fraction (sand and gravel).						
		CL	Reddish brown sandy lean CLAY, moist and very stiff. ...<1% subangular gravel, 5% subrounded sand, 95% fines; <1% mica; poorly sorted course fraction (sand and gravel) .						
80			**END OF TEST PIT AT 80.0 FEET**						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 4

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 2671895.69, E 834777.38
EXPLORATION DATE: 8/6/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 39.59'
DATE MEASURED: 8/7/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		SM	Brown silty SAND with gravel, dry and dense. PIDs (10.6 & 11.7 eV)= 0.2, 0.0 ppmV. 15% angular to subangular gravel, 75% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspars and pyroxene.						
2.5									
5			...light brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
7.5									
10			...brown. PIDs (10.6 & 11.7 eV)= 0.1, 0.0 ppmV.						
12.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 4

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 2671895.69, E 834777.38
EXPLORATION DATE: 8/6/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 39.59'
DATE MEASURED: 8/7/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15			...light brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
17.5									
20			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
22.5									
25			...brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
27.5									
30			...reddish brown, increasing gravel size to 2 inches. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

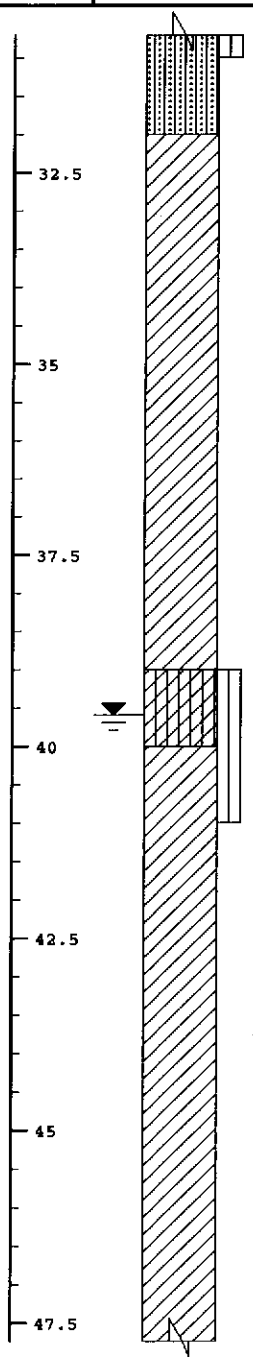
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 4

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 2671895.69, E 834777.38
EXPLORATION DATE: 8/6/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 39.59'
DATE MEASURED: 8/7/07



ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
		CL	MUDDY CREEK FORMATION: Reddish brown sandy lean CLAY, white gypsum salt and crystals, wet and very stiff. Gypsum is present from 32 feet to 35 feet.						
			...PIDs (10.6 & 11.7 eV)= 0.1, 0.0 ppmV.						
			...wet.						
		CL-ML	Dark brown silty CLAY with sand, trace gravel, wet and very stiff.						
		CL	Reddish brown sandy lean CLAY, wet and very stiff. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
			...light gray with orange oxidation mottling.						
			...light olive brown.						
			...PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						

EXPLORATION LOG
AA-UW 4

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 2671895.69, E 834777.38
EXPLORATION DATE: 8/6/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 39.59'
DATE MEASURED: 8/7/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
50			...reddish brown. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
52.5		SC	Reddish brown clayey SAND, wet and dense.						
55		CL	Reddish brown sandy lean CLAY, wet and very stiff.						
			END OF TEST PIT AT 55.0 FEET						
57.5									
60									
62.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 5

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26718163.09, E 832800.88
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 45.39'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		GP	Light brown poorly graded GRAVEL with sand, dry and dense. PIDs (10.6 & 11.7 eV)= 0. 4, 0.1 ppmV. 60% angular gravel, 30% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspars and mafic minerals (pyroxene).						
2.5									
5		GW-GM	Light brown well graded GRAVEL with silt and sand, dry and dense. Gravel size increases to 2 inches. PIDs (10.6 & 11.7 eV)= 0. 2, 0.0 ppmV. 75% angular gravel, 15% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted with feldspar and mafic minerals (pyroxene). ...large cobble or boulder encountered. ...drill through large cobble or boulder. ...PIDs (10.6 & 11.7 eV)= 0.1 0.0 ppmV.						
7.5									
10									
12.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 5

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26718163.09, E 832800.88
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 45.39'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15		GP	Light brown poorly graded GRAVEL with silt and sand, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0 0.0 ppmV. 80% angular gravel, 15% subrounded to subangular sand, 5 % fines; <1% mica; poorly sorted with feldspar and mafic minerals (pyroxene).						
17.5									
20		SM	Light reddish brown silty SAND, trace gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 5% angular gravel, 90% subrounded to subangular sand, 5% fines; <1% mica; poorly sorted gravel with feldspar and mafic minerals (pyroxene), well sorted sand.						
22.5									
25			...PIDs (10.6 & 11.7 eV)= 0.1 0.0 ppmV.						
27.5									
30		GW	Light reddish brown well graded GRAVEL with silt and sand, dry and very dense. PIDs (10.6 &						

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 5

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26718163.09, E 832800.88
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 45.39'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
			11.7 eV)= 0.0, 0.0 ppmV. 45% subangular gravel, 40% subrounded to subangular sand, 5% fines; <1% mica; poorly sorted with feldspar.						
35		SM	Reddish gray silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0 0.0 ppmV. 20% angular to subangular gravel, 75% subrounded to subangular sand, 5% fines; <1% mica; poorly sorted with feldspar. ...brown, moist.						
40		SC	Mottled light gray and reddish brown clayey SAND with gravel, moist and very dense.						
42.5		SM	Reddish gray silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 30% angular gravel, 60% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted with feldspar. ...moist. ...wet.						
45		SC	MUDDY CREEK FORMATION: Reddish brown with white mottling clayey SAND, trace weathered white caliche nodules, moist and very dense. PIDs (10.6 & 11.7 eV)= 0.0 0.0 ppmV. 15% subangular gravel, 50% subrounded to sunangular sand, 35% fines; <1% mica; poorly sorted with gypsum and						
47.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 5

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26718163.09, E 832800.88
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 45.39'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
			feldspar.						
50		CL	Reddish brown sandy lean CLAY, moist and very stiff. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 1% subangular gravel, 10% subrounded sand, 89% fines; <1% mica; poorly sorted course fraction (sand and gravel)						
52.5									
55		CL	...wet to 57 feet.						
57.5			...set well at 57.0 feet bgs.						
60			**END OF TEST PIT AT 60.0 FEET**						
62.5									
65									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

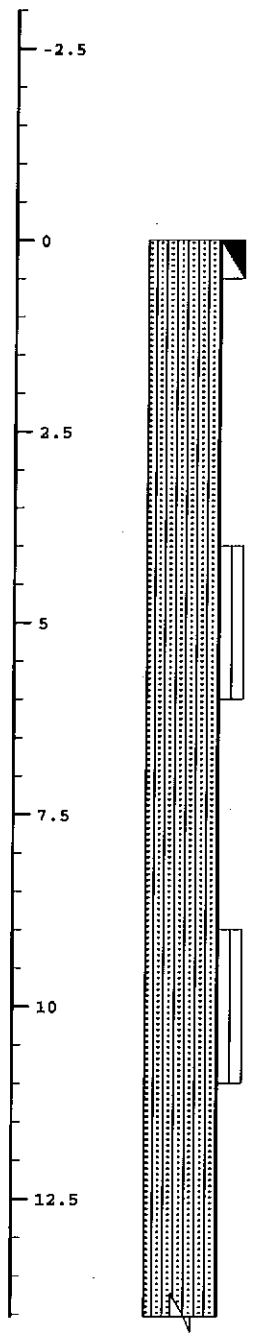
Figure No.

EXPLORATION LOG
AA-UW 6

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26719633.12, E 831429.68
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 55.3'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
-2.5									
0		SM	Pinkish gray silty SAND with gravel, dry and medium dense. PIDs (10.6 & 11.7 eV)= 0.3, 0.0 ppmV. 20% angular gravel, 70% subrounded sand, 10% fines; <1% mica; poorly sorted with feldspars and mafic minerals (pyroxene). ...dense.						
2.5									
5			...reddish gray, very dense. PIDs (10.6 & 11.7 eV)= 0. 2, 0.0 ppmV.						
7.5									
10			...light reddish brown. PIDs (10.6 & 11.7 eV)= 0.2 0.0 ppmV.						
12.5									



The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

EXPLORATION LOG
AA-UW 6

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26719633.12, E 831429.68
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 55.3'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
15		GW	Light brown well graded GRAVEL with silt and sand, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.1 0.0 ppmV. 55% angular to subangular gravel, 35% subrounded to subangular sand, 10 % fines; <1% mica; poorly sorted with feldspar and mafic minerals (pyroxene).						
17.5									
20			...PIDs (10.6 & 11.7 eV)= 0.1, 0.0 ppmV.						
22.5									
25		SM	Reddish gray silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.1 0.0 ppmV. 35% angular gravel, 55% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted gravel with feldspar and mafic minerals (pyroxene), well sorted sand.						
27.5			...little cobbles.						
30			...cobbles to 6 inches in diameter. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						

EXPLORATION LOG
AA-UW 6

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26719633.12, E 831429.68
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 55.3'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
32.5									
35		CL	MUDDY CREEK FORMATION: Light gray to light grayish brown sandy lean CLAY, some gypsum, dry and very stiff. 5% subangular gravel, 25% subrounded sand, 70% fines; <1% mica; poorly sorted gravel, well sorted sand, with 20% gypsum.						
37.5		SM	Reddish gray silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0 0.0 ppmV. 20% angular to subangular gravel, 75% subrounded to subangular sand, 5% fines; <1% mica; poorly sorted with feldspar. ...brown, moist.						
40		SC	Mottled light gray and reddish brown clayey SAND with gravel, moist and very dense.						
42.5		SM	Reddish gray silty SAND with gravel, dry and very dense. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV. 30% angular gravel, 60% subrounded to subangular sand, 10% fines; <1% mica; poorly sorted with feldspar. ...moist. ...wet, light olive brown.						
45		SC	...brown. Decreasing percent gravel and sand. 1% Gravel, 10% sand, 89% fines. PIDs (10.6 & 11.7 eV)= 0.0 0.0 ppmV.						
47.5									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No.

EXPLORATION LOG
AA-UW 6

PROJECT: BRC DEEP BACKGROUND INVESTIGATION
PROJECT NO.: 20072228V1
EXPLORATION LOCATION: N 26719633.12, E 831429.68
EXPLORATION DATE: 8/7/07
EXPLORATION SIZE (dia.): 6" O.D. SAMPLER
EQUIPMENT: SONIC DRILL RIG
ELEVATION: EXISTING GROUND SURFACE
LOGGED BY: HILLMAN/COOKE

INITIAL DEPTH TO WATER: NA
DATE MEASURED: NA
FINAL DEPTH TO WATER: 55.3'
DATE MEASURED: 8/8/07

ELEVATION/ DEPTH	SOIL & SAMPLE SYMBOLS	USCS	DESCRIPTION	PI	LL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% SWELL	WELL CONSTRUCTION
50		CL	Reddish brown sandy lean CLAY, moist and very stiff. PIDs (10.6 & 11.7 eV)= 0.0, 0.0 ppmV.						
52.5									
55		CL	...wet to 57 feet.						
57.5		SC	Olive gray clayey SAND, wet and very dense. 1% subangular gravel, 65% subrounded sand, 34% fines; <1% mica; poorly sorted gravel and well sorted sand with feldspar and mafic minerals. ...0.0% gravel, 70 % subangular sand, 30% fines; <1% mica; well sorted sand with feldspar and mafic minerals.						
60			**END OF TEST PIT AT 60.0 FEET**						
62.5									
65									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Clayey sand
	Low plasticity clay
	Poorly graded gravel with clay
	Well graded gravel
	Poorly graded sand
	Silty low plasticity clay
	Poorly graded gravel
	Well graded gravel with silt
Misc. Symbols	
	Boring continues
	Water table at date indicated

Symbol	Description
Soil Samplers	
	Bulk/Grab sample
	Rock core
Monitor Well Details	
	riser with cover and protective casing
	bentonite pellets
	bentonite slurry
	silica sand, blank PVC
	slotted pipe w/ sand
	end of well installation

Notes:

1. Exploratory borings were drilled on 8/7/07 using a 4-inch diameter continuous flight power auger.

2. No free water was encountered at the time of drilling or when re-checked the following day.

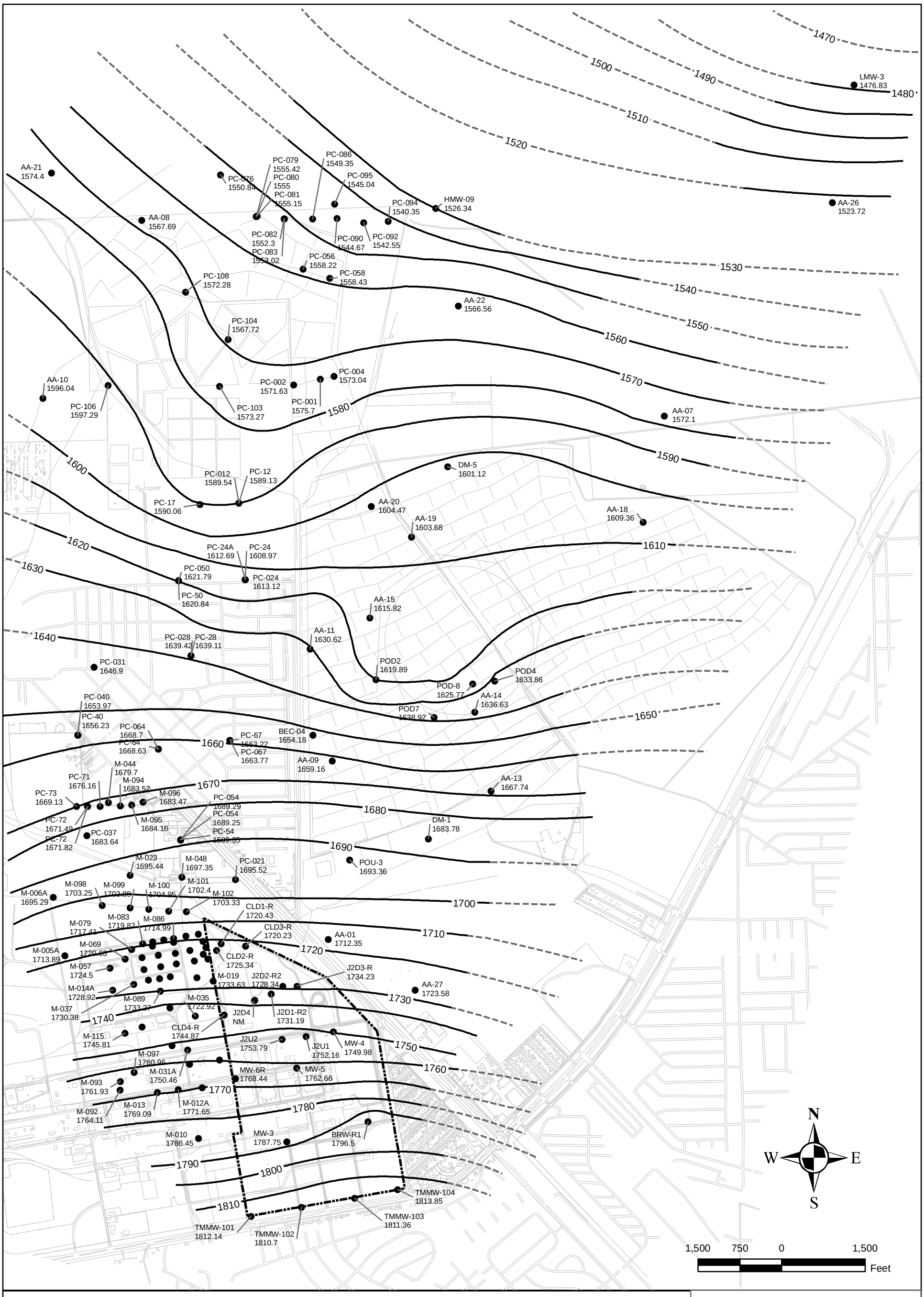
3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

Appendix C

Off-Site Source Information



BRW-R1 ● 1796.5 — MONITORING WELL WITH GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

WATER LEVEL CONTOUR (DASHED WHERE INFERRED)

Data from Timet (April 2006)

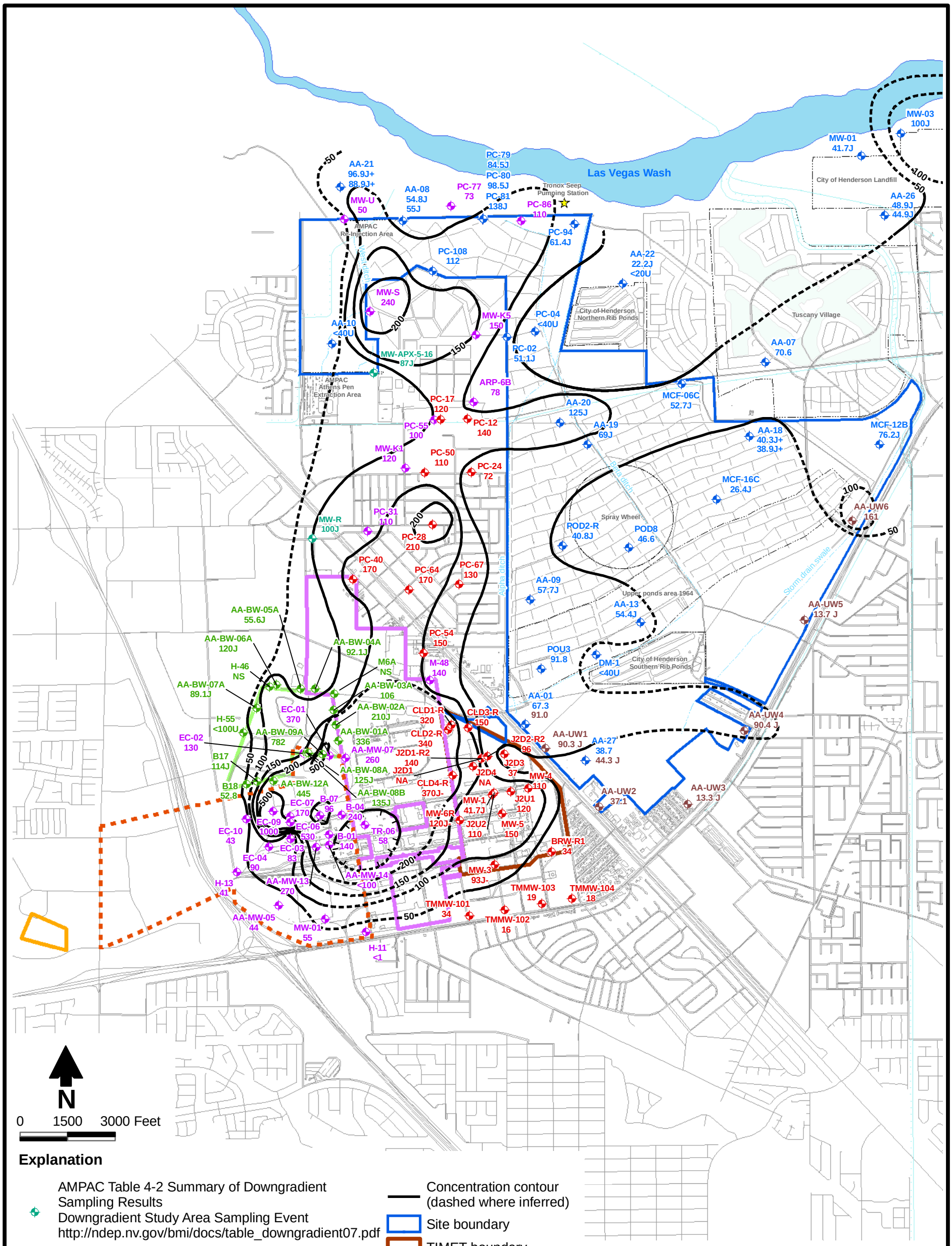
Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-1
POTENTIOMETRIC SURFACE MAP

TIMET

2007-04-05 :\TIMET\CSM-R1\MXD\TIMET_siteWL.mxd TTEMI-MO michelle.handley

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/ARSENIC_2006_2009_SHALLOW.MXD 900321



Explanation

- AMPAC Table 4-2 Summary of Downgradient Sampling Results
  Downgradient Study Area Sampling Event
  http://ndep.nv.gov/bmi/docs/table_downgradient07.pdf
- Reported results from BRC sampling 1st round April-June, 2006
- MWH Figure D-15 Arsenic in aluvial aquifer October-November 2007
- TIMET Figure 4-14 Arsenic in groundwater Spring 2006
- Second Quarter 2008 data (Companies Report dated 7/17/08)
- Data for proposed upgradient wells from 2009 sampling event

- Concentration contour (dashed where inferred)
- Site boundary
- TIMET boundary
- Tronox boundary
- AMPAC facility
- POSSM (The Companies)
- Las Vegas wash
- Streets
- Site AOC3 boundary

Note:
1. Values > MCL (10 µg/L)
2. NA = Not analyzed
3. NS = Not sampled
4. ND = Non detect
5. < = Non-detect at or above the reported concentration
6. For off-site wells, the screened zone is assumed to be shallow

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE C-2
Arsenic in the Shallow Zone (µg/L)
2006-2009

Basic Remediation COMPANY

Prepared by: DBS&A CRS Date 12-30-09

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_Pre_CSM_tasks/GIS/MXDS/CHEMISTRY/ARSENIC_2006_SHALLOW.MXD 905011

Daniel B. Stephens & Associates, Inc.

AA-21
7.5

AA-08
7.5 J-

PC-79
0.02 U
PC-80
0.02 U
PC-81
0.2 UJ

PC-108
0.041

PC-94
15.1 J-

AA-26
4.5

N
W
E
S

AA-22
2.9

10

PC-2
18.8

PC-4
32.7

AA-10
8.2

AA-07
13.1

PC-017
25

PC-012
48

AA-20
34.7

AA-19
165

BEC-09
64.8

AA-18
11.2

PC-050
26

PC-024
47

PC-024
12

PC-028
33

POD2-R
25.8 J+

POD-8
40.9

BEC-06
38.2

PC-040
4 U

PC-064
74

PC-067
59

AA-09
23.8 J

AA-13
29.7

PC-054
35

DM-1
19.2 J

POU-3
10 J+

CLD1-R
11

CLD3-R
28

AA-01
11.8 J

CLD2-R
5.7

J2D2-R2
38

J2D3
13

AA-27
14.1 J+

J2D1
NA

J2D4
NA

J2D1-R2
15

J2U1
10

CLD4-R
13

J2U2
44

MW-4
2.8

MW-01
6.6 J-

MW-6R
3.2

MW-5
7.6

BRW-R1
11

MW-3
9.6

TMMW-104
0.59

TMMW-101
1 U

TMMW-103
12

TMMW-102
3.3

1,500 750 0 1,500
Feet

MW-4
2.8
MONITORING WELL WITH NITRATE AS NITROGEN CONCENTRATION (mg/L)

BRW-R1
11
MONITORING WELL WITH NITRATE AS NITROGEN CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1
NA
WELL NOT ANALYZED

mg/L MILLIGRAM PER LITER

10 NITRATE AS NITROGEN CONTOUR (mg/L)

APPROXIMATE CONTOUR LOCATION

NOTES:
1. The screening level used for nitrate is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for nitrate is 10 mg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-3
NITRATE AS NITROGEN IN GROUNDWATER SPRING 2006

TIMET

2007-01-05 :\TIMETCSM-R1\MXD\TIMET_siteN.mxd TTEMI-MO michelle.handley

N
W
E
S

AA-21
6220

AA-08
2480

PC-79
1790

PC-80
1370

PC-81
1690

PC-94
1560

AA-26
608

PC-108
1400

AA-22
968

AA-10
2640

PC-4
3600

PC-2
1390

AA-07
566

1000

PC-017
3500

PC-012
2900

AA-20
4800 J-

AA-18
1010

AA-19
1620

BEC-09
4870 J-

PC-050
3200

PC-024
4600

PC-028
1200

POD2-R
1900

POD-8
2420

BEC-06
3570

PC-040
5800

PC-064
1800

PC-067
5900

AA-09
2550 J

1000

AA-13
680

PC-054
890

DM-1
761 J

POU-3
3190

CLD1-R
980

CLD3-R
7000

AA-01
1780

J2D1-R2
1800

CLD2-R
460

J2D4
NA

J2D3
1100

AA-27
886

J2D2-R2
3300

CLD4-R
2300

J2U2
1000

J2U1
690

MW-4
210

MW-5
570

MW-6R
620

MW-01
454

BRW-R1
290

MW-3
370

TMMW-104
130

TMMW-101
140

TMMW-102
100

TMMW-103
590

1,500 750 0 1,500
Feet

MW-4 210 — MONITORING WELL WITH CHLORIDE CONCENTRATION (mg/L)

MW-3 370 — MONITORING WELL WITH CHLORIDE CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

mg/L — MILLIGRAM PER LITER

1000 — CHLORIDE CONTOUR (mg/L)

APPROXIMATE CONTOUR LOCATION

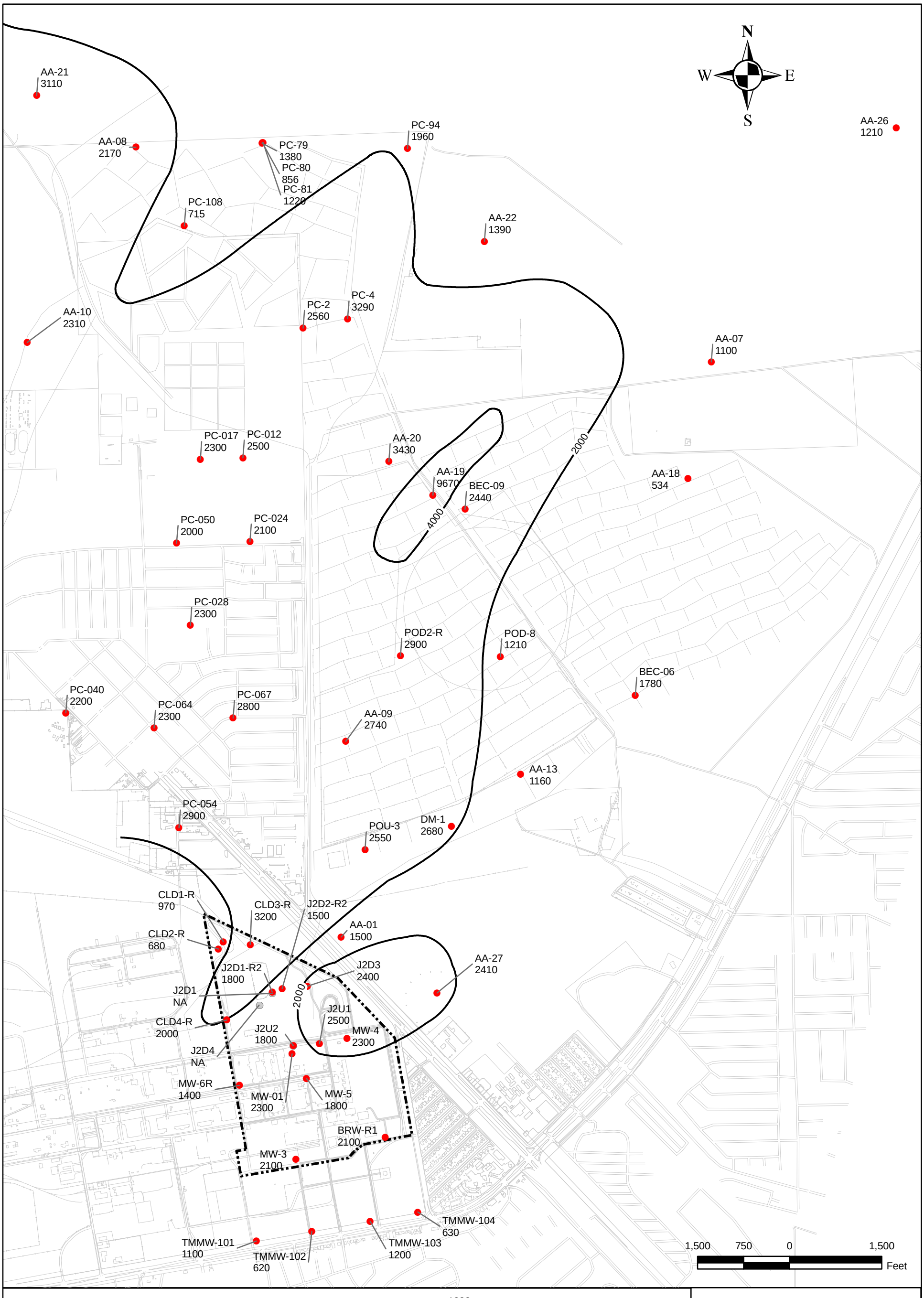
NOTES:
1. The screening level used for chloride is the EPA National Secondary Drinking Water Standard. The standard for chloride is 250 mg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-4
CHLORIDE IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 :\TIMET\CSM-R1\MXD\TIMET_siteCHLORIDE.mxd TTEMI-MO michelle.handley



CLD2-R 680 — MONITORING WELL WITH SULFATE CONCENTRATION (mg/L) EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

mg/L — MILLIGRAM PER LITER

1000 — SULFATE CONTOUR (mg/L)

APPROXIMATE CONTOUR LOCATION

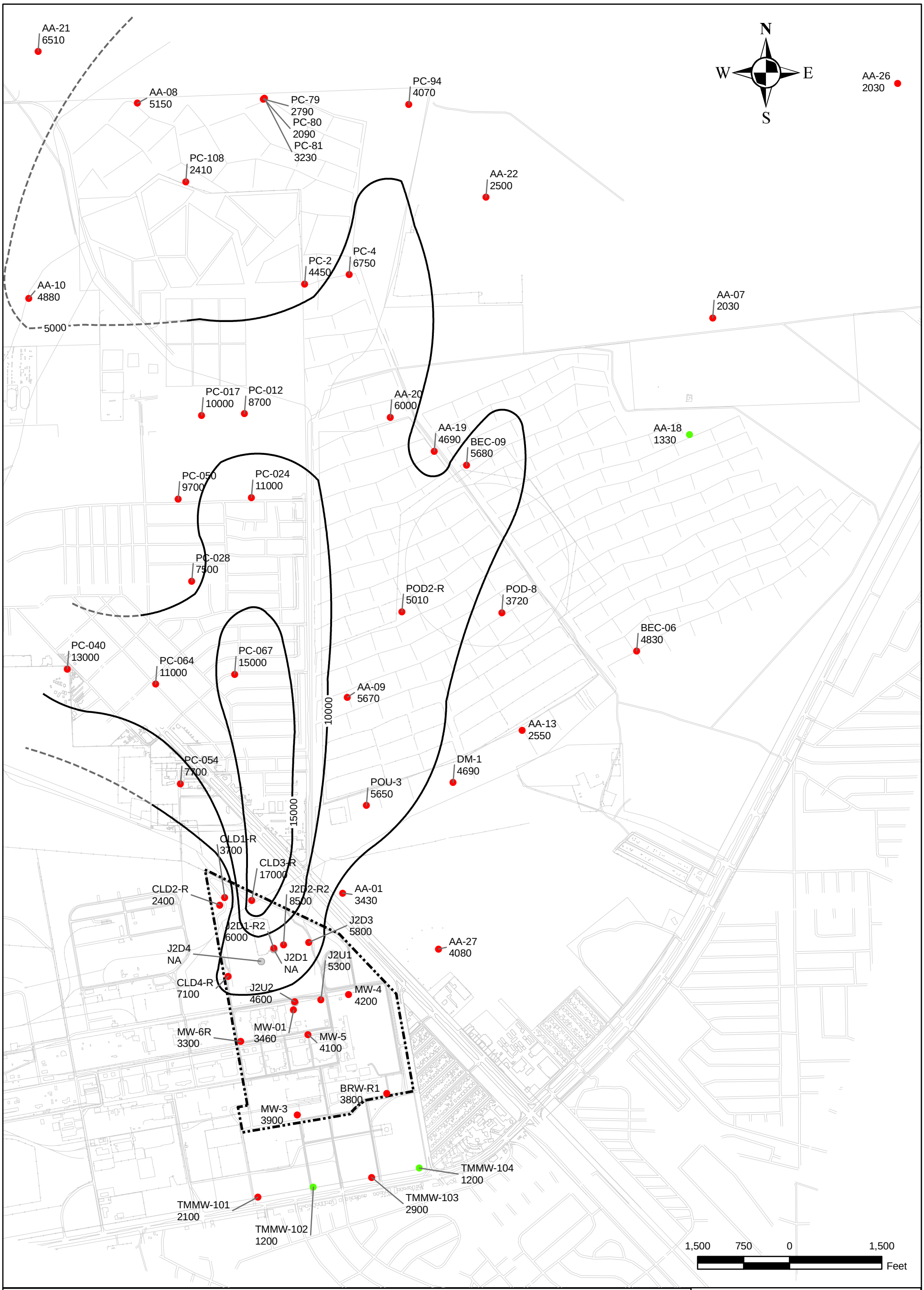
NOTES:
1. The screening level used for sulfate is the EPA National Secondary Drinking Water Standard. The standard for sulfate is 250 mg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-5
SULFATE IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 :\TIMET\CSM-RIMXD\TIMET_sites.mxd TTEMI-MO michelle.handley



TMMW-104 1200 — MONITORING WELL WITH TOTAL DISSOLVED SOLIDS CONCENTRATION (mg/L)

BRW-R1 3800 — MONITORING WELL WITH TOTAL DISSOLVED SOLIDS CONCENTRATION (mg/L) EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

mg/L — MILLIGRAM PER LITER

10000 — TOTAL DISSOLVED SOLIDS CONTOUR (mg/L)

APPROXIMATE CONTOUR LOCATION

NOTES:
1. The screening level used for total dissolved solids is the State of Nevada Administration Code, Toxic Standards Applicable to Designated Waters. The standard for total dissolved solids is 1,900 mg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-6
TOTAL DISSOLVED SOLIDS IN GROUNDWATER SPRING 2006

TIMET

2007-01-05 :\TIMET\CSM-RI\MXD\TIMET_siteTDS.mxd TTEMI-MO michelle.handley

N
W E
S

AA-21
96.9 J+

AA-08
54.9 J

PC-79
84.5 J
PC-80
98.5 J
PC-81
138 J

PC-94
61.4 J

AA-26
44.8 J

PC-108
112

AA-22
100 U

PC-2
51.1 J

PC-4
200 U

AA-10
200 U

AA-07
70.6

PC-017
120

PC-012
140

AA-20
125 J

AA-19
69 J

BEC-09
89.9 J

AA-18
40.3 J+

PC-050
110

PC-024
72

100

PC-028
210

POD2-R
40.8 J

POD-8
46.6

BEC-06
37.4

PC-040
170

PC-064
170

PC-067
130

AA-09
57.7 J

AA-13
54.4 J

PC-054
150

DM-1
200 U

POU-3
91.8

CLD3-R
150

200

CLD1-R
320

300

CLD2-R
340

J2D2-R2
96

AA-01
67.3

J2D3
37

AA-27
38.7

J2D1-R2
140

J2D4
NA

J2D1
NA

J2U1
120

CLD4-R
370 J-

J2U2
110

MW-4
110

MW-5
150

MW-6R
120 J-

MW-01
41.7 J

BRW-R1
34

MW-3
93 J-

TMMW-101
34

TMMW-102
16

TMMW-103
19

TMMW-104
18

1,500 750 0 1,500
Feet

MW-3
93 J-
MONITORING WELL WITH ARSENIC CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1
NA
WELL NOT ANALYZED

µg/L MICROGRAM PER LITER

100 ARSENIC CONTOUR (µg/L)

APPROXIMATE CONTOUR LOCATION

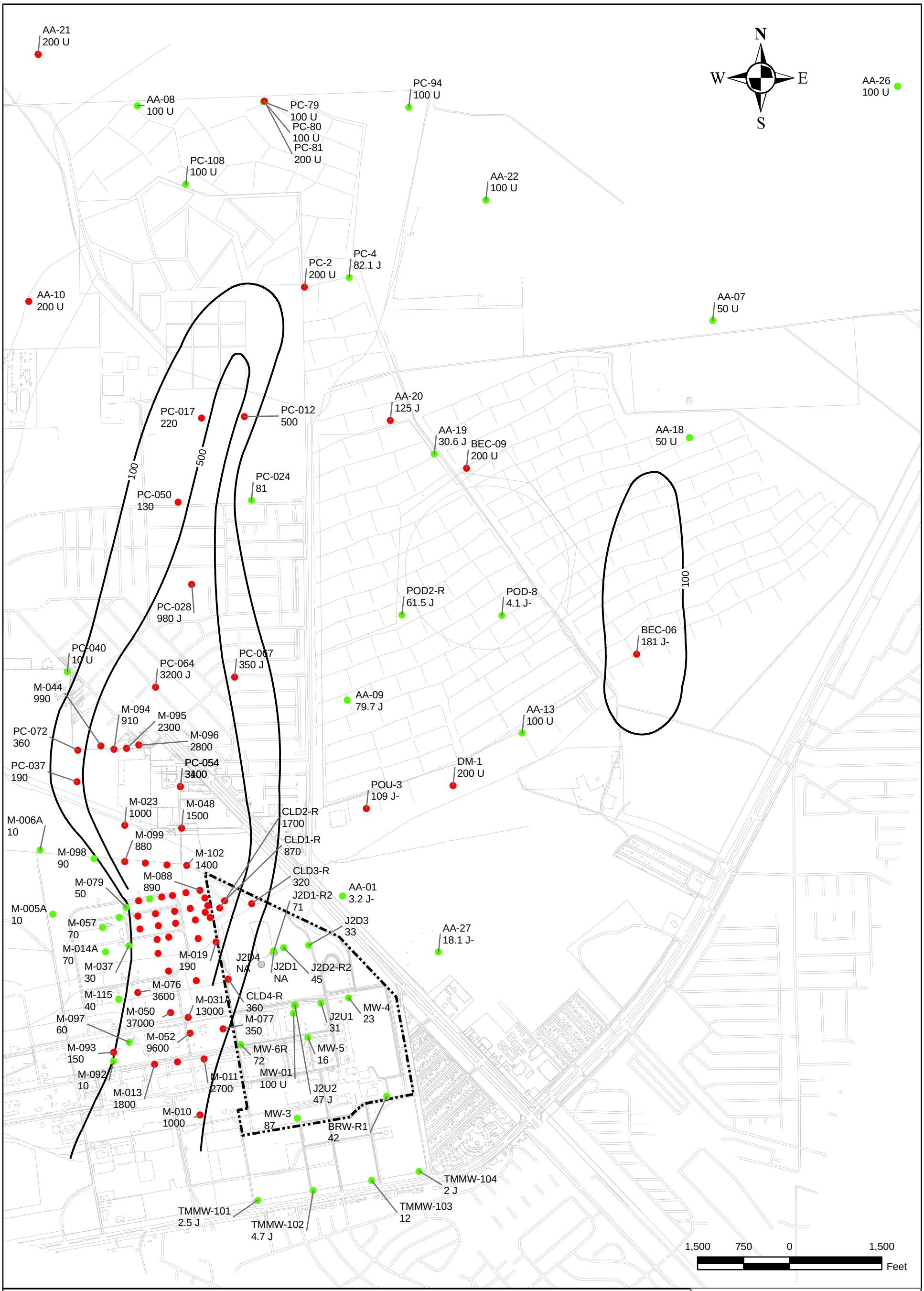
NOTES:
1. The screening level used for arsenic is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for arsenic is 10 µg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-7
ARSENIC IN GROUNDWATER
SPRING 2006

TIMET

2007-2-12 :\TIMET\CSM-R1\MXD\TIMET_siteAS.mxd TTEMI-MO michelle.handley



BRW-R1 42 — MONITORING WELL WITH CHROMIUM CONCENTRATION (µg/L)

M-010 1000 — MONITORING WELL WITH CHROMIUM CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

µg/L — MICROGRAM PER LITER

100 — CHROMIUM CONTOUR (µg/L)

APPROXIMATE CONTOUR LOCATION

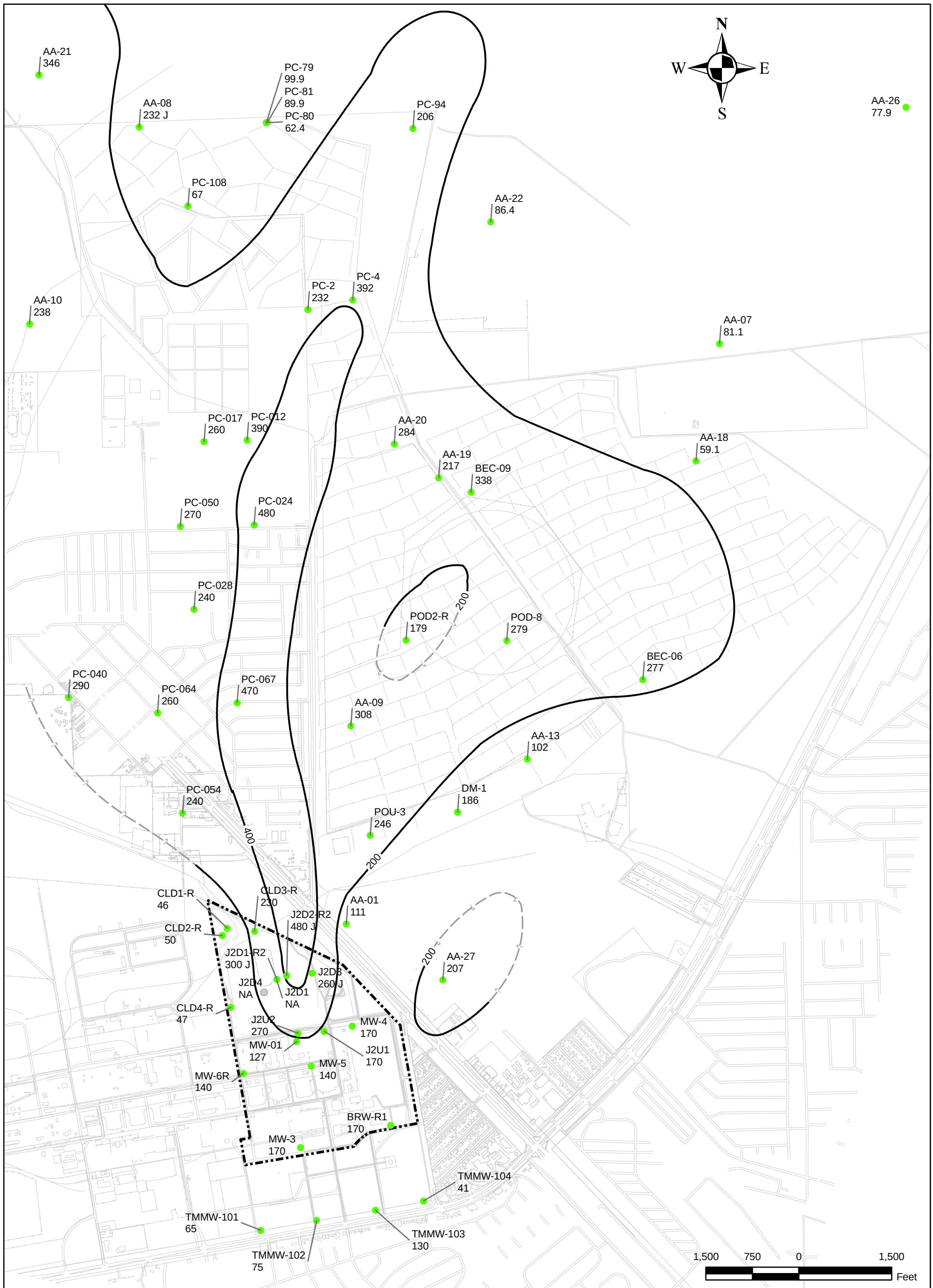
NOTES:
1. The screening level used for chromium is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for chromium is 100 µg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-8
CHROMIUM IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 .\TIMET\CSM-R1\MXD\TIMET_siteCHROMIUM.mxd TTEMI-MO michelle.handley



BRW-R1 170 — MONITORING WELL WITH MAGNESIUM CONCENTRATION (mg/L)

J2D1 NA — WELL NOT ANALYZED

100 — MAGNESIUM CONTOUR (mg/L)

APPROXIMATE CONTOUR LOCATION

mg/L MILLIGRAM PER LITER

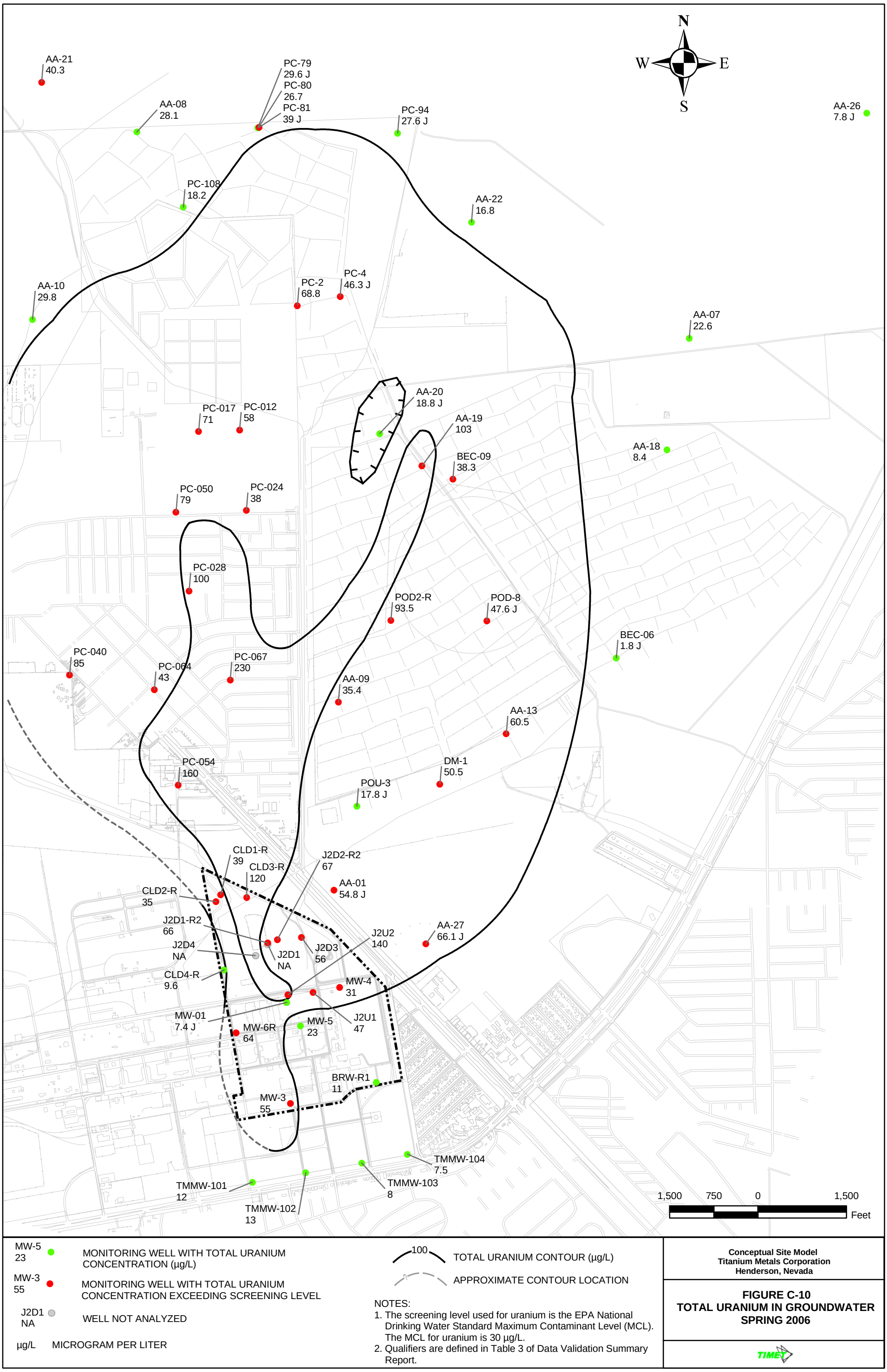
NOTES:
1. There are no EPA National Primary or Secondary Drinking Water Standards for magnesium.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-9
MAGNESIUM IN GROUNDWATER
SPRING 2006

TIMET

2007-3-30 :\TIMET\CSM-R1\MXD\TIMET_siteMAGNESIUM.mxd TTEMI-MO michelle.handley



MW-5 23 — MONITORING WELL WITH TOTAL URANIUM CONCENTRATION (µg/L)

MW-3 55 — MONITORING WELL WITH TOTAL URANIUM CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

µg/L MICROGRAM PER LITER

100 — TOTAL URANIUM CONTOUR (µg/L)

APPROXIMATE CONTOUR LOCATION

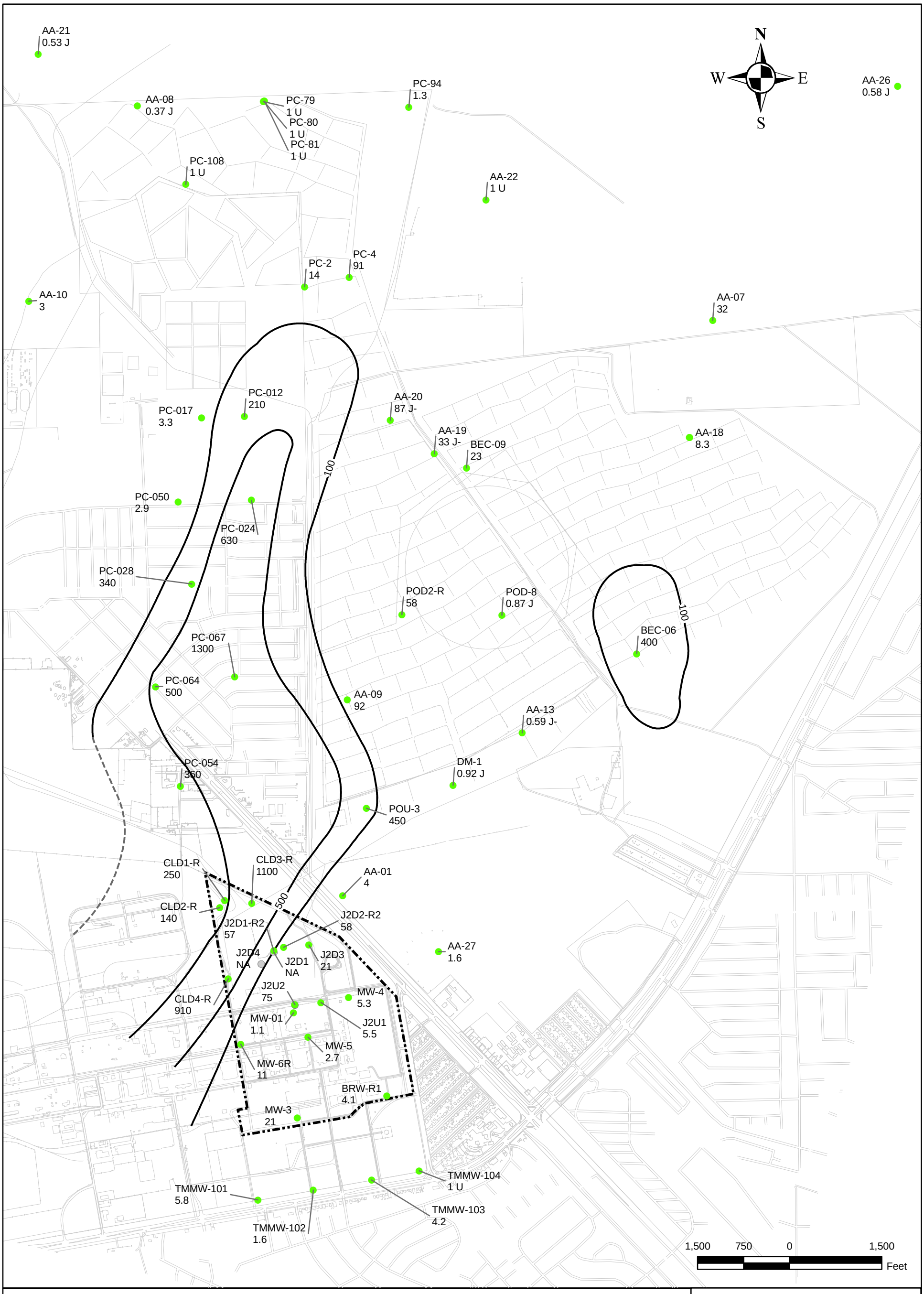
NOTES:
1. The screening level used for uranium is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for uranium is 30 µg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-10
TOTAL URANIUM IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 :\TIMET\CSM-R\MXD\TIMET_siteU.mxd TTEMI-MO michelle.handley



BRW-R1 4.1 — MONITORING WELL WITH CHLOROFORM CONCENTRATION (µg/L)

J2D1 NA — WELL NOT ANALYZED

µg/L — MICROGRAM PER LITER

100 — ARSENIC CONTOUR (µg/L)

APPROXIMATE CONTOUR LOCATION

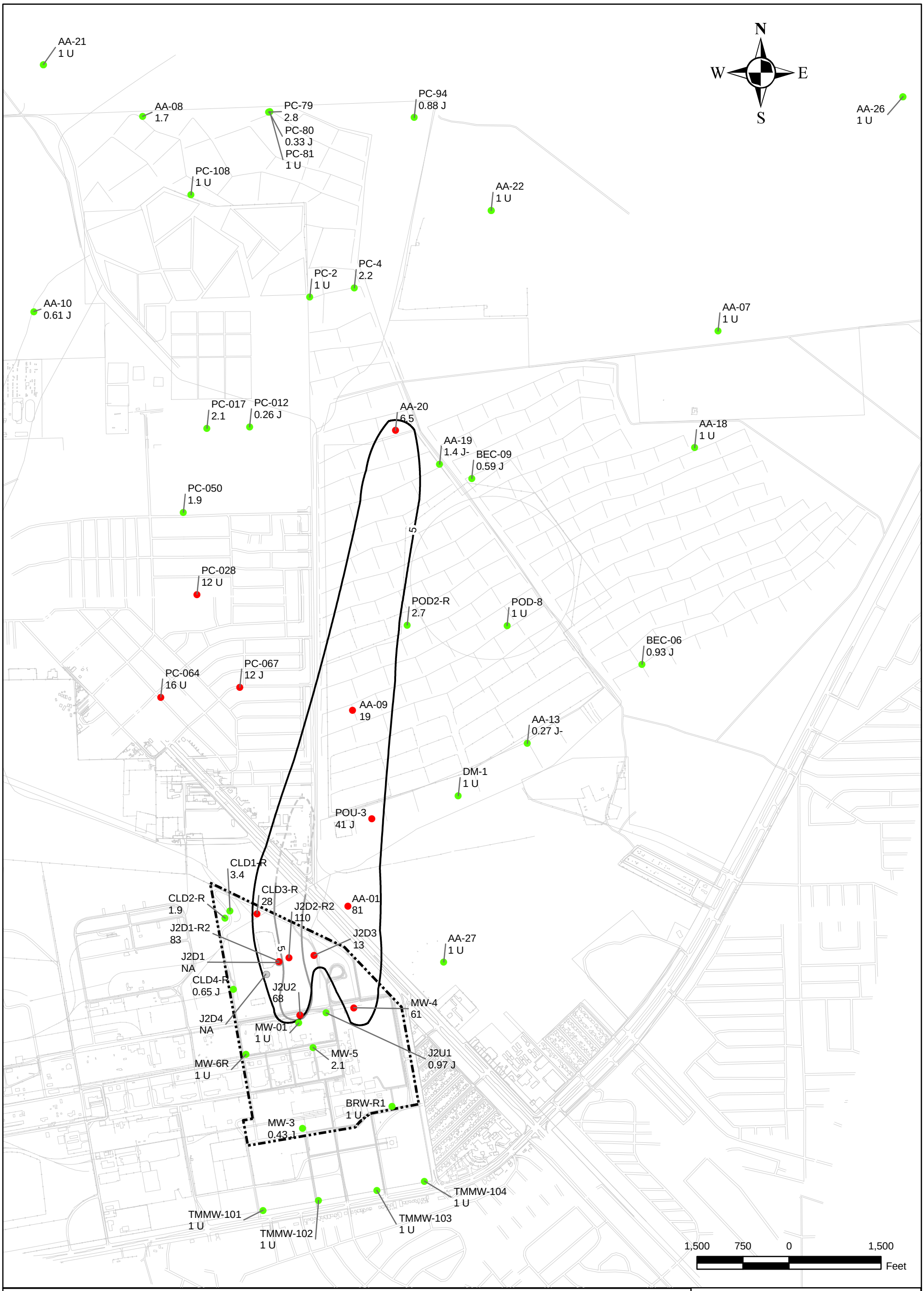
NOTES:
1. There are no EPA National Primary or Secondary Drinking Water Standards for chloroform.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-11
CHLOROFORM IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 .\TIMET\CSM-R1\MXD\TIMET_siteChloroform.mxd TTEMI-MO michelle.handley



MW-3 0.43 J — MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION (µg/L)

J2U2 68 — MONITORING WELL WITH TETRACHLOROETHENE CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1 NA — WELL NOT ANALYZED

µg/L — MICROGRAM PER LITER

NOTES:
1. The screening level used for tetrachloroethene is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for tetrachloroethene is 5 µg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-12
TETRACHLOROETHENE IN GROUNDWATER
SPRING 2006

TIMET

2007-02-12 :\TIMET\CSM-R\MXD\TIMET_sitePCE.mxd TTEMI-MO michelle.handley

N
W E
S

AA-21
1 U

AA-08
1 U

PC-79
0.5 J

PC-80
1 U

PC-81
1 U

PC-94
1 U

AA-26
1 U

PC-108
1 U

AA-22
1 U

PC-2
1 U

PC-4
1 U

AA-10
1 U

AA-07
0.25 B

PC-017
5

PC-012
0.24 J

AA-20
0.3 B

AA-19
1 UJ

BEC-09
1 U

AA-18
1 U

PC-050
4.7

PC-028
12 U

POD2-R
1 U

POD-8
1 U

BEC-06
2.5

PC-064
16 U

PC-067
40 U

AA-09
0.64 J

AA-13
1 UJ

DM-1
1 U

POU-3
1.4

CLD1-R
1 U

CLD3-R
4.2

J2D2-R2
11

AA-01
0.34 J

CLD2-R
0.26 J

J2D1-R2
2.3

5

J2D3
0.81 J

AA-27
1 U

J2D4
NA

J2D1
NA

J2U1
1 U

CLD4-R
0.3 J

J2U2
12

MW-4
0.4 J

MW-6R
1 U

MW-01
1 U

MW-5
1 U

BRW-R1
1 U

MW-3
1 U

TMMW-104
1 U

TMMW-101
1 U

TMMW-103
1 U

TMMW-102
1 U

1,500 750 0 1,500
Feet

BRW-R1
1 U — MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION (µg/L)

J2U2
12 — MONITORING WELL WITH TRICHLOROETHENE CONCENTRATION EXCEEDING SCREENING LEVEL

J2D1
NA — WELL NOT ANALYZED

µg/L MICROGRAM PER LITER

5 — TRICHLOROETHENE CONTOUR (µg/L)

APPROXIMATE CONTOUR LOCATION

NOTES:
1. The screening level used for trichloroethene is the EPA National Drinking Water Standard Maximum Contaminant Level (MCL). The MCL for trichloroethene is 5 µg/L.
2. Qualifiers are defined in Table 3 of Data Validation Summary Report.

Conceptual Site Model
Titanium Metals Corporation
Henderson, Nevada

FIGURE C-13
TRICHLOROETHENE IN GROUNDWATER SPRING 2006

TIMET

2007-01-05 :\TIMET\CSM-R1\MXD\TIMET_siteTCE.mxd TTEMI-MO michelle.handley

BMI COMMON AREA DISPOSAL
(UPPER & LOWER BMI PONDS)

(NE CORNER OF PROPERTY)

OPERATIONS BY:

DELBERT MADSEN & ESTATE OF
DELBERT MADSEN. (2 ACRES)
LOU #67

SOUTHERN NEVADA AUTO PARTS (SNAP)
AREA (10 ACRES)
LOU #68

DILLON POTTER SITE (2 ACRES)
LOU #69

ON-SITE HAZARDOUS WASTE
LANDFILL (CLOSED)
LOU #10

UNNAMED DRAINAGE
DITCH SEGMENT
(BML LANDFILL)
LOU #6

SB1-6
SB1-5
SB1-7
SB1-4
SB1-3
SB1-2
SB1-1

TRADE EFFLUENT
SETTLING PONDS
LOU #1

POND WC-1
LOU #22
WC-WEST
WC-1

POND WC-2
LOU #23
WC-EAST
WC-2

BLDG E-6
BLDG E-5
BLDG E-4

GROUNDWATER REMEDIATION UNIT (AREA)
LOU #32

GROUNDWATER
BARRIER WALL

AREA AFFECTED BY
JULY 1990 FIRE
LOU #55

BLDG E-3
BDLG E-2
BLDG E-1

LOADING DOCK
RAIL ROAD TRACKS

OPEN AREA DUE SOUTH
OF TRADE EFFLUENT
DISPOSAL PONDS
LOU #2

TREATMENT
UNIT

NEW D-1
BLDG

AP PLANT AREA NEW
BLDG D-1 WASHDOWN,
AP TRANSFER LINES TO
SODIUM CHLORATE PROCESS
LOU #58

DRUM RECYCLING AREA
LOU #31

OLD D-1
BLDG

AP AREA PAD
LOU #30

CONT.
TRASH
PAD

AP PLANT
AREA OLD BLDG
D-1 WASHDOWN
LOU #56

AP-5
POND

LOU #19

M-25

NEW AP-6
POND

BETA DITCH

BENCHMARK - BM2
LATITUDE - 36°02'50.35"N
LONGITUDE - 115°00'01.62"W
ALTITUDE - 1,765.220 FT

C-1
POND
LOU #20

AP PLANT SI's AND
TRANSFER LINES
TO/FROM AP SI's
LOU #57

M-89

AP-4
POND
LOU #18

AP-1
POND
LOU #16&17

AP-2
POND
LOU #16&17

AP PLANT AREA
TANK FARM
LOU #53
MCC

LOU #16&17

AP-3
POND

M-17

BETA DITCH
& SMALL DIVERSION DITCH
LOU #5

LOU #21
MN-1
POND

AP PLANT CHANGE
HOUSE/LAB
SEPTIC TANK
LOU #54

AP PLANT AREA SCREENING
BUILDING, DRYER
BUILDING & ASSOC. SUMP
LOU #52

DRYER
BLDG

D-2 BLDG
C-BLDG
OPER.SHACK

RAIL ROAD TRACK

SB6-1
SB6-2

LAB
STORAGE

LAB. AP OFFICES
& CHANGE HOUSE

S8-1S

AP MAINT. SHOP

SATELLITE
ACCUMULATION POINT/
AP MAINTENANCE SHOP
LOU #39

STEAM
PLANT

FORMER OLD MAIN COOLING TOWER
& RECIRCULATION LINES
LOU #46

NEW P-2 POND
LOU #9

P-2

S-1
CLOSED

POND S-1
LOU #13

LEACH BEDS, AND
MANGANESE TAILINGS AREA
LOU #24

LEACH PLANT AREA
LEACH TANKS
LOU #50

LEACH PLANT AREA
SULFURIC ACID STORAGE
LOU #49

SB2-8
SB2-2
SB2-7
SB2-13
SB2-11
SB2-10
SB2-9
SB2-12
SB2-1
SB2-3
SB2-6
SB2-5
SB2-4

P-3
CLOSED

P-2
CLOSED

P-1
CLOSED

POND P-1
LOU #14

OLD P-3 POND
LOU #8

M-21

SB5-1
SB5-2
SB5-3

BERM

DIESEL
TANK

LEACH PLANT
ANALYTE TANKS
LOU #48

AVENUE F

ACID DRAIN
SYSTEM
LOU #60

TRUCK EMPTYING/
DUMPING SITE
LOU #35

SB4-1
SB4-2
SB4-3
SB4-4
SB4-5
SB4-6
SB4-7
SB4-8

OPERATIONS BY KOCH
MATERIALS CO.
LOU # 64

OLD P-2 POND
LOU #7

DIESEL STORAGE
TANK
LOU #45

FORMER MANGANESE
TAILINGS AREA, WESTERN
LOU #34

LEACH PLANT AREA
MANGANESE
ORE PILES
LOU #47

FORMER MANGANESE TAILINGS
AREA, EASTERN
LOU #34

11TH STREET

LEACH PLANT AREA
TRANSFER LINES
(TO/FROM UNIT 6)
LOU #51

BENCHMARK - BM1
LATITUDE - 36°02'34.83"N
LONGITUDE - 114°59'58.45"W
ALTITUDE - 1,812.660 FT

TIMET

CHEMSTAR

NEVADA PRECAST
CONCRETE PRODUCTS
LOU #65

SB-7

M-97

STORM SEWER
SYSTEM
AREA
LOU #59

J.B. KELLEY, INC
TRUCKING SITE
(CONCRETE VAULTS)
LOU #63

ABOVE-GROUND DIESEL
STORAGE TANK, LEASED BY
FLINTKOTE COMPANY
LOU #66

FORMER
AST

HAZARDOUS WASTE
STORAGE AREA
LOU #12

AVENUE G

FORMER SATELLITE ACCUMULATION POINT,
UNIT-6, MAINTENANCE SHOP
LOU #37

HARDESTY CHEMICAL
COMPANY SITE
LOU #4

TRASH STORAGE AREA
LOU #26

PLATINUM DRYING UNIT
LOU #15

SODIUM CHLORATE FILTER
CAKE HOLDING AREA
LOU #11

OLD SODIUM CHLORATE
PLANT DECOMMISSIONING
LOU #61

UNIT 6 BASEMENT
LOU #44

EBONY CONSTRUCTION CO.
LOU #65

FORMER
UST SITE

HAZARDOUS WASTE
STORAGE AREA
LOU #28

UNIT 4 & 5 BASEMENTS
LOU #43

UNIT-4
UNIT-5
UNIT-6
UNIT-7
(TIMET)
UNIT-8
(TIMET)

PCB STORAGE AREA
LOU #27

UNIT 1
TENANT STAINS
LOU #41

S9-1S(A)
S9-1S(B)

LOCATION OF A PORTION
OF FORMER HARDESTY
FACILITY

UNIT-1
UNIT-2
UNIT-3

9TH STREET
10TH STREET
11TH STREET
12TH STREET
8TH STREET
7TH STREET
6TH STREET
5TH STREET
4TH STREET

AVENUE H

OPERATIONS BY:
BUCKLES CONSTRUCTION CO.
LOU #65

R R TRACK #10

SAFETY &
MEDICAL CLINIC

ADMINISTRATION

GASOLINE
TANK

SODIUM PERCHLORATE PLATINUM
BY-PRODUCT FILTER, UNIT 5
LOU #33

PCB TRANSFORMER SPILL
LOU #40

SOLID WASTE DUMPSTER
LOU #29

S-3

GREEN VENTURES
INTERNATIONAL
LOU #65

PROCESS HARDWARE
STORAGE AREA (BETWEEN
UNITS 1 & 2)
LOU #25

FORMER SATELLITE ACCUMULATION
POINT, UNIT-3, MAINTENENCE SHOP
LOU #36

UNIT 2 SALT REDLER
LOU #42

FACILITY BACKGROUND
MONITORING WELL

CONTROL
HOUSE

STATE INDUSTRIES, INC. SITE
(KMCC TENANT)
LOU #62

KMCC
PURCHASING

FIGURE C-14
KERR-McGEE SOURCE AREAS INDENTIFIED IN THE LOU

KERR-McGEE CHEMICAL LLC FACILITY
HENDERSON, NEVADA

SB6-1 •	SOIL SAMPLING LOCATION WITH DESIGNATION
M-10 ⊖	MONITORING WELL LOCATION WITH DESIGNATION
	KMCC PROPERTY BOUNDARY
	RAILROAD TRACKS
	BETA DITCH
LOU#19	ITEMS IDENTIFIED BY NEVADA DIVISION OF ENVIRONMENTAL PROTECTION IN THE 1994 LETTER OF UNDERSTANDING (LOU)
[NOT SHOWN]	LOU #3 – AIR POLLUTION EMISSIONS ASSOCIATED w/ INDUSTRIAL PROCESSES
SI	SURFACE IMPOUNDMENT

0 200' 400' 600'

1 INCH = 200 FEET

N

JANUARY 2005

Plate 6.dwg

Table C-1
Chemical Source areas at Kerr-McGee (Tronox)
From 2005 Conceptual Site Model

Chemical	Listed Potential Source LOUs
Chloroform[1]	4, 6
Nitrate	16, 17
Perchlorate	15-19, 30-33, 43, 52, 53, 55-58
Total Dissolved Solids	20-23, 32, 42
Uranium[1]	6

Note:

[1] *Chloroform detected in sampling from LOU #4 and #6, and uranium detected at LOU#6, but not listed as source areas in the CSM*

Appendix D

Summary of Soil Sampling Metals Data

Appendix D
Summary of Background Metals Evaluation
Shallow McCollough Dataset

	McCullough Site at 0-20 ft bgs (Shallow)								McCullough Background at 0-20 ft bgs (Shallow)								*t*	Quantile	Slippage	WRS	Greater		
Chemical	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	Test *p*	Test *p*	Test *p*	Test *p*	than Bckrnd (1)?	Units	Basis
Aluminum	15	15	100%	9360	13800	11400	11630	1023	101	101	100%	3740	15300	8470	9131	2668	1.0 E-8	9.8 E-2	1.0 E+0	3.4 E-4	NO	mg/kg	Quantile and Slippage; max background > max site.
Antimony	15	15	100%	0.12	0.53	0.15	0.25	0.16	43	101	43%	0.12	0.50	0.16	0.19	0.085	7.1 E-2	4.9 E-2	1.6 E-2	9.3 E-1	NO	mg/kg	Multiple tests
Arsenic	15	15	100%	2.4	4.6	3.3	3.3	0.58	101	101	100%	2.1	7.2	3.9	4.1	1.1	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Barium	15	15	100%	137	609	214	242	107	101	101	100%	73	465	175	182	65	2.7 E-2	3.6 E-2	1.3 E-1	1.4 E-3	NO	mg/kg	Multiple tests
Beryllium	15	15	100%	0.62	0.89	0.71	0.72	0.084	101	101	100%	0.16	0.89	0.54	0.58	0.16	4.8 E-6	2.5 E-1	1.0 E+0	7.2 E-4	NO	mg/kg	Quantile and Slippage; max background and site are equal.
Boron	4	15	27%	4.6	13	10	8.2	3.6	34	95	36%	5.2	12	1.6	3.6	2.8	8.9 E-5	8.0 E-1	6.9 E-2	9.1 E-8	YES	mg/kg	Low detection frequency; Site median and mean are greater than background.
Cadmium	9	15	60%	0.094	0.13	0.13	0.38	0.47	6	101	6%	0.095	0.16	0.065	0.068	0.013	1.2 E-2	2.8 E-11	1.0 E+0	2.3 E-2	YES	mg/kg	Low detection frequency; Site median and mean are greater than background.
Calcium	15	15	100%	15100	41700	24800	26330	7898	95	95	100%	9440	82800	24500	29030	14960	8.5 E-1	9.4 E-1	1.0 E+0	4.5 E-1	NO	mg/kg	Multiple tests
Chromium (VI)	1	13	8%	0.22	0.22	0.22	0.35	0.16	0	95	0%	NA	NA	0.13	0.13	0.0043	1.6 E-4	1.0 E+0	NA	3.5 E-8	YES	mg/kg	ND in background.
Chromium (Total)	15	15	100%	11	19	14	14	2.7	101	101	100%	2.6	17	9.0	9.0	3.0	1.0 E-6	2.1 E-4	1.8 E-3	5.2 E-7	YES	mg/kg	Multiple tests
Cobalt	15	15	100%	8.1	11	9.5	9.5	0.82	101	101	100%	3.7	16	8.8	8.7	2.3	6.3 E-3	7.3 E-1	1.0 E+0	4.0 E-2	NO	mg/kg	Multiple tests
Copper	15	15	100%	16	54	18	24	12	101	101	100%	10	26	18	17	3.6	3.0 E-2	3.1 E-1	1.8 E-3	3.1 E-2	NO	mg/kg	Multiple tests
Iron	15	15	100%	18000	25100	20700	21270	2528	101	101	100%	5410	19700	13500	13200	3320	1.0 E-10	1.4 E-11	6.6 E-10	6.1 E-10	YES	mg/kg	Multiple tests
Lead	15	15	100%	8.0	18	9.5	10	2.2	101	101	100%	3.0	35	7.3	8.5	4.3	1.6 E-2	3.1 E-1	1.0 E+0	6.3 E-4	NO	mg/kg	Quantile and slippage; max background is greater than max site.
Lithium	9	15	60%	9.6	29	13	15	5.4	95	95	100%	7.5	27	13	14	4.4	2.9 E-1	5.6 E-1	1.3 E-1	1.8 E-3	NO	mg/kg	Multiple tests
Magnesium	15	15	100%	9690	12700	10300	10620	906	101	101	100%	4690	17500	10200	10180	2799	1.1 E-1	9.3 E-1	1.0 E+0	2.2 E-1	NO	mg/kg	Multiple tests
Manganese	15	15	100%	390	604	468	477	69	101	101	100%	151	863	409	416	127	4.7 E-3	1.3 E-1	1.0 E+0	1.5 E-2	NO	mg/kg	Quantile and slippage; max background is greater than max site.
Mercury	6	15	40%	0.0087	0.024	0.018	0.017	0.0049	79	101	78%	0.0084	0.11	0.014	0.018	0.016	NA	9.9 E-1	1.0 E+0	2.3 E-3	NO	mg/kg	Low detection frequency; background max and mean are greater than at site.
Molybdenum	15	15	100%	0.32	1.7	0.49	0.59	0.33	101	101	100%	0.17	2.0	0.48	0.53	0.25	2.6 E-1	2.8 E-1	1.0 E+0	2.9 E-1	NO	mg/kg	Multiple tests
Nickel	15	15	100%	14	19	18	17	1.8	101	101	100%	7.9	30	16	16	4.1	3.4 E-2	3.1 E-1	1.0 E+0	8.8 E-2	NO	mg/kg	Multiple tests
Niobium	2	15	13%	1.7	1.8	1.3	1.4	0.72	0	95	0%	NA	NA	0.51	0.51	0	9.2 E-5	1.1 E-9	NA	0.0 E+0	YES	mg/kg	ND in background.
Palladium	15	15	100%	0.38	0.76	0.62	0.60	0.12	95	95	100%	0.16	1.5	0.42	0.48	0.24	3.6 E-3	1.0 E-1	1.0 E+0	2.8 E-3	NO	mg/kg	Quantile and slippage; max background is greater than max site.
Phosphorus	15	15	100%	1010	2130	1520	1519	294	95	95	100%	862	2010	1490	1474	278	2.9 E-1	5.6 E-1	1.4 E-1	3.4 E-1	NO	mg/kg	Multiple tests
Platinum	0	15	0%	NA	NA	0.010	0.027	0.021	5	95	5%	0.045	0.099	0.022	0.024	0.012	3.4 E-1	7.3 E-4	1.0 E+0	9.7 E-1	NO	mg/kg	ND at Site
Potassium	15	15	100%	1140	2920	1690	1846	550	95	95	100%	625	3890	1580	1754	759	2.9 E-1	5.6 E-1	1.0 E+0	1.6 E-1	NO	mg/kg	Multiple tests
Selenium	3	15	20%	0.32	0.58	0.16	0.23	0.12	39	101	39%	0.10	0.60	0.079	0.17	0.12	2.8 E-2	7.6 E-1	1.0 E+0	5.0 E-8	NO	mg/kg	Low detection frequency; site and background datasets similar.
Silicon	15	15	100%	181	1210	818	758	270	95	95	100%	335	4150	721	1007	811	9.9 E-1	9.9 E-1	1.0 E+0	5.7 E-1	NO	mg/kg	Multiple tests
Silver	12	15	80%	0.095	0.27	0.14	0.15	0.067	6	101	6%	0.043	0.083	0.13	0.13	0.018	9.2 E-2	1.3 E-1	5.4 E-5	1.0 E+0	YES	mg/kg	Low detection frequency; max site is greater than max background.
Sodium	15	15	100%	450	2650	853	942	507	95	95	100%	128	1320	487	498	285	2.3 E-3	3.4 E-5	1.4 E-1	8.9 E-6	YES	mg/kg	Multiple tests
Strontium	15	15	100%	194	448	332	327	63	95	95	100%	76	808	192	233	133	4.0 E-5	9.6 E-3	1.0 E+0	1.6 E-4	YES	mg/kg	Multiple tests
Thallium	1	15	7%	1.8	1.8	0.10	0.63	0.91	27	101	27%	0.13	1.8	0.27	0.51	0.48	3.1 E-1	7.6 E-1	1.0 E+0	9.7 E-1	NO	mg/kg	Low detection frequency; site and background datasets similar.
Tin	12	15	80%	0.36	0.73	0.60	0.58	0.096	95	95	100%	0.24	0.80	0.51	0.50	0.11	4.1 E-3	2.5 E-2	1.0 E+0	1.4 E-4	NO	mg/kg	Quantile and slippage; site and background data are similar.
Titanium	15	15	100%	688	1360	1120	1106	163	101	101	100%	262	1010	533	552	150	1.9 E-10	2.5 E-9	1.9 E-15	6.1 E-10	YES	mg/kg	Multiple tests
Tungsten	9	15	60%	0.22	0.74	0.30	0.37	0.17	0	95	0%	NA	NA	0.0088	0.0088	0	5.5 E-7	8.2 E-17	NA	0.0 E+0	YES	mg/kg	ND in background.
Uranium	15	15	100%	0.86	1.5	1.1	1.1	0.19	94	94	100%	0.62	2.7	0.97	1.0	0.31	5.4 E-2	4.1 E-2	1.0 E+0	1.2 E-2	NO	mg/kg	Multiple tests
Vanadium	15	15	100%	49	68	57	57	5.7	101	101	100%	20	59	37	38	8.8	1.5 E-11	2.8 E-11	1.9 E-5	2.9 E-9	YES	mg/kg	Multiple tests
Zinc	15	15	100%	38	76	43	49	12	101	101	100%	15	121	39	38	13	3.6 E-3	1.3 E-1	1.0 E+0	1.3 E-3	NO	mg/kg	Quantile and slippage; max background is greater than max site.
Zirconium	14	15	93%	13	30	27	24	7.0	95	95	100%	86	179	129	131	22	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Radium-226	15	15	100%	0.69	1.3	0.88	0.93	0.21	91	95	96%	0.49	2.4	1.1	1.1	0.34	1.0 E+0	8.0 E-1	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Radium-228	14	15	93%	1.0	2.0	1.5	1.5	0.26	65	81	80%	1.2	2.9	1.9	1.9	0.39	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests

Appendix D
Summary of Background Metals Evaluation
Shallow McCollough Dataset

	McCullough Site at 0-20 ft bgs (Shallow)								McCullough Background at 0-20 ft bgs (Shallow)								*t*	Quantile	Slippage	WRS	Greater		
Chemical	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	Test *p*	Test *p*	Test *p*	Test *p*	than Bckrnd (1)?	Units	Basis
Thorium-228	15	15	100%	1.3	1.9	1.6	1.6	0.18	101	101	100%	1.2	2.3	1.8	1.7	0.26	1.0 E+0	9.9 E-1	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Thorium-230	13	15	87%	0.95	2.3	1.2	1.2	0.34	101	101	100%	0.73	3.0	1.2	1.3	0.39	9.0 E-1	9.3 E-1	1.0 E+0	6.9 E-1	NO	pCi/g	Multiple tests
Thorium-232	15	15	100%	1.1	1.9	1.5	1.5	0.20	101	101	100%	1.2	2.2	1.7	1.7	0.26	9.9 E-1	9.2 E-1	1.0 E+0	9.6 E-1	NO	pCi/g	Multiple tests
Uranium-233/234	13	15	87%	0.31	1.2	0.60	0.61	0.24	51	101	50%	0.70	2.8	1.1	1.2	0.46	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Uranium-235/236	4	15	27%	0.019	0.078	0.013	0.027	0.027	45	101	45%	0.037	0.21	0.060	0.070	0.038	1.0 E+0	9.9 E-1	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Uranium-238	13	15	87%	0.19	1.1	0.60	0.56	0.30	101	101	100%	0.65	2.4	1.1	1.2	0.36	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Deep McCollough Dataset

Chemical	McCullough Site at >= 20 ft bgs (Deep)								McCullough Background at >= 20 ft bgs (Deep)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Aluminum	24	24	100%	7660	13000	10750	10730	1429	79	79	100%	5060	15100	8790	8693	1814	3.6 E-7	5.3 E-4	1.0 E+0	1.1 E-6	YES	mg/kg	Multiple tests
Antimony	19	24	79%	0.11	0.50	0.14	0.18	0.14	73	79	92%	0.089	0.22	0.14	0.14	0.036	7.1 E-2	8.2 E-1	2.1 E-3	6.0 E-1	NO	mg/kg	Multiple tests
Arsenic	24	24	100%	2.8	13	4.0	4.5	1.9	79	79	100%	2.2	13	3.8	4.4	2.0	3.9 E-1	7.6 E-1	1.0 E+0	2.1 E-1	NO	mg/kg	Multiple tests
Barium	24	24	100%	107	368	193	199	57	79	79	100%	85	539	138	156	70	1.9 E-3	4.6 E-4	1.0 E+0	3.3 E-5	YES	mg/kg	Multiple tests
Beryllium	24	24	100%	0.50	0.86	0.64	0.65	0.083	79	79	100%	0.29	0.67	0.55	0.56	0.063	1.5 E-5	6.7 E-5	1.7 E-5	1.5 E-6	YES	mg/kg	Multiple tests
Boron	3	24	13%	3.8	6.3	10	9.3	2.8	20	79	25%	3.0	7.6	1.4	2.4	1.9	9.8 E-13	9.5 E-1	1.0 E+0	3.6 E-15	NO	mg/kg	Low detection frequency; max background greater than max site.
Cadmium	19	24	79%	0.065	0.12	0.11	0.22	0.35	73	79	92%	0.050	0.13	0.083	0.081	0.027	2.9 E-2	2.2 E-2	1.0 E+0	3.8 E-6	NO	mg/kg	Site and background datasets similar.
Calcium	24	24	100%	18200	47500	24350	25490	5913	79	79	100%	10700	46600	24500	24970	7156	3.6 E-1	9.7 E-1	2.3 E-1	3.5 E-1	NO	mg/kg	Multiple tests
Chromium (VI)	1	18	6%	0.40	0.40	0.50	0.43	0.15	18	80	23%	0.18	1.6	0.085	0.16	0.23	7.9 E-8	9.9 E-1	1.0 E+0	9.6 E-12	NO	mg/kg	Low detection frequency; background max 4x the site max.
Chromium (Total)	24	24	100%	7.5	23	13	13	3.3	79	79	100%	7.1	17	10	11	1.8	1.8 E-3	4.6 E-4	5.3 E-2	3.0 E-4	YES	mg/kg	Multiple tests
Cobalt	24	24	100%	5.6	10	8.7	8.4	1.1	79	79	100%	5.3	11	7.5	7.8	1.3	1.3 E-2	3.5 E-1	1.0 E+0	5.2 E-3	NO	mg/kg	Site and background datasets similar.
Copper	24	24	100%	12	38	17	18	4.7	79	79	100%	8.8	24	16	16	2.1	3.6 E-2	3.5 E-2	2.3 E-1	4.1 E-3	NO	mg/kg	Multiple tests
Iron	24	24	100%	11600	26600	19200	19050	3420	79	79	100%	11200	22500	14700	15350	2815	1.6 E-5	6.7 E-5	5.3 E-2	5.7 E-6	YES	mg/kg	Multiple tests
Lead	24	24	100%	7.0	11	9.0	8.9	1.1	79	79	100%	4.9	16	7.1	7.4	1.6	2.5 E-6	4.6 E-4	1.0 E+0	5.7 E-6	YES	mg/kg	Multiple tests
Lithium	12	24	50%	11	49	13	17	7.9	67	79	85%	7.5	124	17	17	14	6.3 E-1	9.2 E-1	1.0 E+0	1.3 E-4	NO	mg/kg	Multiple tests
Magnesium	24	24	100%	8710	21600	10300	10610	2478	79	79	100%	4990	12500	9530	9553	1455	2.8 E-2	5.6 E-1	2.3 E-1	1.2 E-2	NO	mg/kg	Multiple tests
Manganese	24	24	100%	295	513	436	422	57	79	79	100%	217	579	319	343	84	1.3 E-6	2.4 E-3	1.0 E+0	1.6 E-5	YES	mg/kg	Multiple tests
Mercury	8	24	33%	0.0075	0.015	0.014	0.012	0.0059	35	79	44%	0.0072	0.024	0.0033	0.0075	0.0054	NA	9.8 E-1	1.0 E+0	4.6 E-5	NO	mg/kg	Low detection frequency; max background greater than max site.
Molybdenum	24	24	100%	0.31	1.5	0.43	0.52	0.27	62	79	78%	0.31	1.9	0.50	0.54	0.37	5.9 E-1	9.0 E-1	1.0 E+0	8.0 E-1	NO	mg/kg	Multiple tests
Nickel	24	24	100%	9.9	20	15	15	2.1	79	79	100%	8.5	28	15	16	2.4	7.4 E-1	6.1 E-1	1.0 E+0	5.7 E-1	NO	mg/kg	Multiple tests
Niobium	0	24	0%	NA	NA	0.76	0.99	0.56	6	79	8%	1.7	3.8	0.76	0.94	0.66	3.6 E-1	7.7 E-2	1.0 E+0	3.4 E-2	NO	mg/kg	ND at site.
Palladium	24	24	100%	0.31	0.88	0.47	0.52	0.16	79	79	100%	0.20	2.2	0.61	0.67	0.37	1.0 E+0	9.8 E-1	1.0 E+0	9.6 E-1	NO	mg/kg	Multiple tests
Phosphorus	24	24	100%	988	1940	1400	1435	251	79	79	100%	649	1930	1390	1369	208	1.2 E-1	3.5 E-2	2.3 E-1	1.9 E-1	NO	mg/kg	Multiple tests
Platinum	0	24	0%	NA	NA	0.010	0.019	0.018	7	79	9%	0.022	0.049	0.010	0.012	0.0071	3.7 E-2	1.1 E-1	1.0 E+0	3.3 E-2	NO	mg/kg	ND at site.
Potassium	24	24	100%	925	2430	1445	1445	338	79	79	100%	850	2450	1430	1499	357	7.5 E-1	9.2 E-1	1.0 E+0	7.0 E-1	NO	mg/kg	Multiple tests
Selenium	2	24	8%	0.29	0.40	0.16	0.19	0.061	0	79	0%	NA	NA	0.16	0.16	0	1.5 E-2	2.4 E-3	NA	1.2 E-3	YES	mg/kg	ND in background.
Silicon	24	24	100%	197	1310	814	772	245	79	79	100%	139	1080	617	591	282	1.9 E-3	9.7 E-2	2.3 E-1	2.9 E-3	YES	mg/kg	Site max, mean and median are greater than background.
Silver	21	24	88%	0.063	0.45	0.15	0.16	0.091	79	79	100%	0.074	2.2	0.15	0.25	0.38	9.7 E-1	4.0 E-1	1.0 E+0	5.2 E-1	NO	mg/kg	Multiple tests
Sodium	24	24	100%	619	1230	988	967	185	79	79	100%	428	3250	776	864	378	3.7 E-2	7.6 E-2	1.0 E+0	2.7 E-3	NO	mg/kg	Multiple tests
Strontium	24	24	100%	213	429	286	298	55	79	79	100%	123	793	250	275	104	7.6 E-2	5.1 E-1	1.0 E+0	8.4 E-3	NO	mg/kg	Multiple tests
Thallium	1	24	4%	1.9	1.9	0.10	0.25	0.39	4	79	5%	0.15	0.34	0.10	0.11	0.032	4.6 E-2	1.6 E-2	2.0 E-1	7.9 E-4	YES	mg/kg	Low detection frequency; site max > 5 times max background.
Tin	21	24	88%	0.35	0.70	0.57	0.54	0.12	76	79	96%	0.25	0.78	0.55	0.53	0.14	3.9 E-1	2.1 E-1	1.0 E+0	1.2 E-1	NO	mg/kg	Multiple tests
Titanium	24	24	100%	424	1310	1030	982	223	79	79	100%	445	912	671	680	110	3.9 E-7	1.8 E-12	3.0 E-14	2.7 E-8	YES	mg/kg	Multiple tests
Tungsten	9	24	38%	0.24	0.35	0.25	0.27	0.17	25	79	32%	0.19	3.6	0.10	0.21	0.40	1.7 E-1	5.6 E-1	1.0 E+0	6.1 E-4	NO	mg/kg	Low detection frequency; max background greater than max site.
Uranium	24	24	100%	1.0	4.0	1.5	1.6	0.56	79	79	100%	0.89	2.8	1.4	1.6	0.42	3.5 E-1	9.5 E-1	2.3 E-1	2.7 E-1	NO	mg/kg	Quantile and Slippage
Vanadium	24	24	100%	31	69	55	52	9.6	79	79	100%	27	73	43	46	10	4.2 E-3	3.5 E-2	1.0 E+0	3.2 E-3	NO	mg/kg	Slippage and quantile; site and background datasets similar.
Zinc	24	24	100%	32	70	40	42	7.4	79	79	100%	18	41	32	32	3.8	5.9 E-7	1.8 E-12	8.3 E-8	4.0 E-11	YES	mg/kg	Multiple tests
Zirconium	21	24	88%	12	32	27	24	7.3	79	79	100%	16	34	26	25	3.7	8.6 E-1	9.7 E-2	1.0 E+0	4.4 E-1	NO	mg/kg	Multiple tests
Radium-226	24	24	100%	0.57	1.8	0.92	1.0	0.25	65	65	100%	0.98	2.3	1.6	1.7	0.33	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests

Appendix D
Summary of Background Metals Evaluation
Deep McCollough Dataset

Chemical	McCullough Site at >= 20 ft bgs (Deep)								McCullough Background at >= 20 ft bgs (Deep)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Radium-228	23	24	96%	1.2	2.0	1.6	1.6	0.15	64	64	100%	0.86	2.3	1.4	1.5	0.30	3.6 E-2	6.0 E-1	1.0 E+0	3.2 E-3	NO	pCi/g	Multiple tests
Thorium-228	24	24	100%	1.1	2.0	1.7	1.6	0.21	79	79	100%	1.1	2.3	1.8	1.8	0.25	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Thorium-230	21	24	88%	0.92	2.4	1.3	1.4	0.34	79	79	100%	1.1	2.7	1.6	1.7	0.36	1.0 E+0	9.9 E-1	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests
Thorium-232	24	24	100%	1.1	2.1	1.5	1.5	0.21	79	79	100%	0.91	2.0	1.5	1.6	0.21	8.8 E-1	6.1 E-1	2.3 E-1	9.3 E-1	NO	pCi/g	Multiple tests
Uranium-233/234	23	24	96%	0.21	3.2	0.63	0.75	0.56	76	76	100%	0.87	2.6	1.6	1.6	0.37	1.0 E+0	1.0 E+0	2.4 E-1	1.0 E+0	NO	pCi/g	Multiple tests
Uranium-235/236	12	24	50%	0.013	0.13	0.020	0.027	0.026	68	76	89%	0.029	0.12	0.065	0.063	0.022	1.0 E+0	1.0 E+0	2.4 E-1	1.0 E+0	NO	pCi/g	Multiple tests
Uranium-238	21	24	88%	0.18	1.7	0.46	0.57	0.32	76	76	100%	0.99	2.8	1.5	1.5	0.37	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Multiple tests

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Shallow River Dataset

	River Site at 0-20 ft bgs (Shallow)								River Background at 0-20 ft bgs (Shallow)								*t*	Quantile	Slippage	WRS	Greater		
Chemical	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	Test *p*	Test *p*	Test *p*	Test *p*	than Bckrnd?	Units	Basis
Aluminum	2	2	100%	7600	7910	7755	7755	219	33	33	100%	5330	15500	9260	9742	2812	1.0 E+0	1.0 E+0	1.0 E+0	8.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Antimony	2	2	100%	0.22	0.26	0.24	0.24	0.028	13	33	39%	0.19	0.61	0.063	0.16	0.14	2.7 E-2	1.0 E+0	1.0 E+0	1.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Arsenic	2	2	100%	6.7	10	8.5	8.5	2.5	33	33	100%	4.5	28	7.7	8.6	4.4	5.3 E-1	4.5 E-1	1.0 E+0	3.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Barium	2	2	100%	453	546	500	500	66	33	33	100%	211	755	428	466	173	3.0 E-1	1.0 E+0	1.0 E+0	2.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Beryllium	2	2	100%	0.36	0.39	0.38	0.38	0.021	33	33	100%	0.28	0.78	0.40	0.44	0.13	9.8 E-1	1.0 E+0	1.0 E+0	7.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Boron	0	2	0%	NA	NA	10	10	0.035	15	33	45%	7.1	57	3.3	7.8	9.7	7.4 E-2	1.0 E+0	1.0 E+0	8.9 E-3	NA	mg/kg	Insufficient data for statistical comparisons.
Cadmium	2	2	100%	0.080	0.082	0.081	0.081	0.0014	21	33	64%	0.053	0.26	0.079	0.084	0.064	5.9 E-1	1.0 E+0	1.0 E+0	4.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Calcium	2	2	100%	16500	34300	25400	25400	12590	33	33	100%	3430	71300	25400	27830	13950	5.8 E-1	4.5 E-1	1.0 E+0	5.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (VI)	0	2	0%	NA	NA	0.50	0.50	0	0	33	0%	NA	NA	0.21	0.22	0.019	1.6 E-39	1.0 E+0	NA	8.5 E-3	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (Total)	2	2	100%	9.4	11	10	10	1.1	33	33	100%	3.2	24	9.9	11	4.6	7.2 E-1	1.0 E+0	1.0 E+0	5.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Cobalt	2	2	100%	4.2	5.0	4.6	4.6	0.57	33	33	100%	3.7	8.9	4.7	5.0	1.2	7.7 E-1	1.0 E+0	1.0 E+0	6.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Copper	2	2	100%	8.9	9.7	9.3	9.3	0.57	33	33	100%	8.0	36	11	13	5.7	1.0 E+0	1.0 E+0	1.0 E+0	9.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Iron	2	2	100%	9110	10100	9605	9605	700	33	33	100%	6210	21700	9310	10260	3488	7.8 E-1	1.0 E+0	1.0 E+0	4.4 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lead	2	2	100%	16	16	16	16	0.14	33	33	100%	7.6	53	12	15	9.6	2.7 E-1	4.5 E-1	1.0 E+0	1.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lithium	2	2	100%	19	34	27	27	10	6	33	18%	26	42	7.3	10	12	1.2 E-1	6.1 E-2	1.0 E+0	4.2 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Magnesium	2	2	100%	4850	6930	5890	5890	1471	33	33	100%	1550	15000	7580	8206	2706	8.9 E-1	1.0 E+0	1.0 E+0	9.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Manganese	2	2	100%	315	427	371	371	79	33	33	100%	178	2070	295	411	368	6.7 E-1	4.5 E-1	1.0 E+0	2.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Mercury	0	2	0%	NA	NA	0.0067	0.0067	0	0	33	0%	NA	NA	0.0067	0.0067	NA	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Molybdenum	2	2	100%	0.52	0.90	0.71	0.71	0.27	33	33	100%	0.28	2.3	0.64	0.79	0.42	6.2 E-1	1.0 E+0	1.0 E+0	5.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Nickel	2	2	100%	10	13	11	11	2.0	33	33	100%	9.1	22	12	13	2.9	7.3 E-1	1.0 E+0	1.0 E+0	6.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Niobium	0	2	0%	NA	NA	0.76	0.76	0	1	33	3%	4.6	4.6	1.5	1.6	0.54	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NA	mg/kg	Insufficient data for statistical comparisons.
Palladium	2	2	100%	0.38	0.44	0.41	0.41	0.042	33	33	100%	0.35	1.6	0.73	0.79	0.28	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Phosphorus	2	2	100%	821	982	902	902	114	33	33	100%	296	1710	754	806	277	2.1 E-1	4.5 E-1	1.0 E+0	1.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Platinum	0	2	0%	NA	NA	0.020	0.020	0	0	33	0%	NA	NA	0.048	0.048	0	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Potassium	2	2	100%	1710	2960	2335	2335	884	33	33	100%	1090	9000	2820	3525	2038	8.7 E-1	1.0 E+0	1.0 E+0	7.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Selenium	0	2	0%	NA	NA	0.32	0.32	0	0	33	0%	NA	NA	0.32	0.32	0	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Silicon	2	2	100%	557	844	701	701	203	33	33	100%	344	7480	1190	1433	1246	9.9 E-1	1.0 E+0	1.0 E+0	9.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Silver	2	2	100%	0.079	0.080	0.080	0.080	0.00071	14	33	42%	0.054	0.17	0.055	0.072	0.032	9.6 E-2	1.0 E+0	1.0 E+0	9.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Sodium	2	2	100%	502	621	562	562	84	33	33	100%	274	4210	1370	1576	966	1.0 E+0	1.0 E+0	1.0 E+0	9.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Strontium	2	2	100%	265	323	294	294	41	33	33	100%	172	761	379	392	144	9.6 E-1	1.0 E+0	1.0 E+0	8.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Thallium	0	2	0%	NA	NA	0.21	0.21	0	6	33	18%	0.43	2.0	0.15	0.25	0.33	7.9 E-1	1.0 E+0	1.0 E+0	2.1 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Tin	0	2	0%	NA	NA	0.21	0.21	0	16	33	48%	0.32	1.0	0.15	0.31	0.21	1.0 E+0	1.0 E+0	1.0 E+0	1.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Titanium	2	2	100%	440	449	445	445	6.4	33	33	100%	215	611	380	408	114	4.1 E-2	1.0 E+0	1.0 E+0	3.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Tungsten	2	2	100%	0.40	0.51	0.46	0.46	0.078	2	33	6%	0.96	1.0	0.25	0.29	0.18	7.3 E-2	1.7 E-1	1.0 E+0	6.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Uranium	2	2	100%	0.69	1.2	0.95	0.95	0.36	33	33	100%	0.56	4.3	0.92	1.2	0.74	7.4 E-1	1.0 E+0	1.0 E+0	6.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Vanadium	2	2	100%	24	30	27	27	4.7	33	33	100%	19	55	29	30	7.1	7.6 E-1	1.0 E+0	1.0 E+0	7.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.

Appendix D
Summary of Background Metals Evaluation
Shallow River Dataset

Chemical	River Site at 0-20 ft bgs (Shallow)								River Background at 0-20 ft bgs (Shallow)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Zinc	2	2	100%	35	46	40	40	7.6	33	33	100%	25	71	35	37	9.9	3.2 E-1	4.5 E-1	1.0 E+0	1.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Zirconium	2	2	100%	9.6	11	10	10	0.99	13	33	39%	9.1	17	0.40	4.8	5.7	9.8 E-4	4.5 E-1	1.0 E+0	1.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Radium-226	1	2	50%	0.80	0.80	0.77	0.77	0.033	31	33	94%	0.57	2.8	0.99	1.1	0.51	9.0 E-1	1.0 E+0	1.0 E+0	9.1 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Radium-228	2	2	100%	1.1	1.2	1.1	1.1	0.11	28	33	85%	1.1	2.9	1.4	1.5	0.55	9.9 E-1	1.0 E+0	1.0 E+0	9.2 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-228	2	2	100%	1.0	1.3	1.2	1.2	0.23	33	33	100%	1.1	3.4	1.6	1.8	0.51	9.5 E-1	1.0 E+0	1.0 E+0	9.7 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-230	2	2	100%	1.0	1.5	1.3	1.3	0.36	27	33	82%	1.0	3.6	1.3	1.5	0.57	6.4 E-1	1.0 E+0	1.0 E+0	5.6 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-232	2	2	100%	1.2	1.3	1.2	1.2	0.071	33	33	100%	1.1	2.8	1.5	1.5	0.32	1.0 E+0	1.0 E+0	1.0 E+0	9.7 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-233/234	2	2	100%	0.27	0.50	0.38	0.38	0.16	33	33	100%	0.70	4.8	1.2	1.5	0.81	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-235/236	0	2	0%	NA	NA	0.012	0.012	0.0054	11	33	33%	0.088	0.24	0.088	0.10	0.057	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-238	2	2	100%	0.24	0.37	0.31	0.31	0.093	33	33	100%	0.55	4.0	0.94	1.2	0.67	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Apppendix D
Summary of Background Metals Evaluation
Deep River Dataset

Chemical	River Site at >= 20 ft bgs (Deep)								River Background at >= 20 ft bgs (Deep)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Aluminum	2	2	100%	5830	6280	6055	6055	318	36	36	100%	5680	13400	8355	8613	1504	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Antimony	2	2	100%	0.19	0.21	0.20	0.20	0.014	36	36	100%	0.14	0.37	0.21	0.22	0.052	9.0 E-1	1.0 E+0	1.0 E+0	7.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Arsenic	2	2	100%	6.3	6.5	6.4	6.4	0.14	36	36	100%	4.7	14	7.2	7.5	2.1	1.0 E+0	1.0 E+0	1.0 E+0	7.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Barium	2	2	100%	259	277	268	268	13	36	36	100%	188	1350	329	399	215	1.0 E+0	1.0 E+0	1.0 E+0	9.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Beryllium	2	2	100%	0.31	0.31	0.31	0.31	0	36	36	100%	0.34	0.72	0.46	0.47	0.073	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Boron	0	2	0%	NA	NA	10	10	0.035	8	36	22%	5.0	24	1.4	3.0	4.1	4.6 E-13	6.4 E-2	1.0 E+0	2.1 E-3	NA	mg/kg	Insufficient data for statistical comparisons.
Cadmium	2	2	100%	0.076	0.081	0.079	0.079	0.0035	26	36	72%	0.034	0.16	0.079	0.071	0.049	1.9 E-1	1.0 E+0	1.0 E+0	5.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Calcium	2	2	100%	23800	40000	31900	31900	11460	36	36	100%	4680	45600	21950	21740	8709	2.1 E-1	4.6 E-1	1.0 E+0	7.5 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (VI)	0	2	0%	NA	NA	0.50	0.50	0	16	41	39%	0.16	1.1	0.085	0.21	0.22	9.5 E-11	1.0 E+0	1.0 E+0	1.1 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (Total)	2	2	100%	7.7	7.8	7.8	7.8	0.071	36	36	100%	7.2	24	10	11	3.1	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Cobalt	2	2	100%	3.7	4.4	4.1	4.1	0.50	36	36	100%	3.5	5.7	4.6	4.6	0.58	8.3 E-1	1.0 E+0	1.0 E+0	9.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Copper	2	2	100%	8.7	11	9.7	9.7	1.3	36	36	100%	8.0	14	10	10	1.3	6.9 E-1	1.0 E+0	1.0 E+0	7.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Iron	2	2	100%	8050	8480	8265	8265	304	36	36	100%	7250	13100	10900	10540	1518	1.0 E+0	1.0 E+0	1.0 E+0	9.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lead	2	2	100%	12	13	12	12	0.71	36	36	100%	9.5	35	12	14	5.9	9.5 E-1	1.0 E+0	1.0 E+0	4.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lithium	2	2	100%	39	40	40	40	0.85	36	36	100%	20	47	30	31	7.1	3.2 E-6	6.4 E-2	1.0 E+0	5.1 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Magnesium	2	2	100%	5100	5920	5510	5510	580	36	36	100%	5210	13900	7210	7629	1884	9.8 E-1	1.0 E+0	1.0 E+0	9.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Manganese	2	2	100%	285	430	358	358	103	36	36	100%	88	777	162	213	124	1.4 E-1	6.4 E-2	1.0 E+0	3.9 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Mercury	0	2	0%	NA	NA	0.0033	0.0033	0	5	28	18%	0.0070	0.010	0.0033	0.0042	0.0020	NA	1.0 E+0	1.0 E+0	7.4 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Molybdenum	2	2	100%	0.37	0.65	0.51	0.51	0.20	31	36	86%	0.26	0.72	0.39	0.38	0.17	2.6 E-1	4.6 E-1	1.0 E+0	1.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Nickel	2	2	100%	10	12	11	11	1.1	36	36	100%	9.2	18	13	13	2.1	9.0 E-1	1.0 E+0	1.0 E+0	9.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Niobium	0	2	0%	NA	NA	0.76	0.76	0	3	36	8%	2.5	3.0	0.76	0.92	0.55	9.6 E-1	1.0 E+0	1.0 E+0	6.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Palladium	2	2	100%	0.36	0.41	0.39	0.39	0.035	36	36	100%	0.24	1.1	0.60	0.58	0.22	1.0 E+0	1.0 E+0	1.0 E+0	8.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Phosphorus	2	2	100%	763	818	791	791	39	36	36	100%	511	1320	820	829	152	8.2 E-1	1.0 E+0	1.0 E+0	7.0 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Platinum	0	2	0%	NA	NA	0.010	0.010	0	0	36	0%	NA	NA	0.010	0.010	0.00025	8.4 E-1	1.0 E+0	NA	5.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Potassium	2	2	100%	1750	1940	1845	1845	134	36	36	100%	2560	12600	3325	4368	2340	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Selenium	0	2	0%	NA	NA	0.16	0.16	0	0	36	0%	NA	NA	0.16	0.16	0.0033	8.4 E-1	1.0 E+0	NA	5.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Silicon	2	2	100%	771	852	812	812	57	36	36	100%	224	1340	618	634	244	1.9 E-2	4.2 E-1	1.0 E+0	8.5 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Silver	2	2	100%	0.091	0.14	0.12	0.12	0.035	36	36	100%	0.046	1.4	0.12	0.19	0.23	9.4 E-1	1.0 E+0	1.0 E+0	5.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Sodium	2	2	100%	794	924	859	859	92	36	36	100%	600	2770	1250	1401	597	1.0 E+0	1.0 E+0	1.0 E+0	9.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Strontium	2	2	100%	255	256	256	256	0.71	36	36	100%	146	559	252	270	95	8.2 E-1	1.0 E+0	1.0 E+0	4.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Thallium	0	2	0%	NA	NA	0.10	0.10	0	0	36	0%	NA	NA	0.10	0.10	0.0025	8.4 E-1	1.0 E+0	NA	5.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Tin	0	2	0%	NA	NA	0.21	0.21	0.0035	16	36	44%	0.25	0.49	0.026	0.18	0.18	1.6 E-1	1.0 E+0	1.0 E+0	2.5 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Titanium	2	2	100%	470	513	492	492	30	36	36	100%	309	712	525	516	98	7.7 E-1	1.0 E+0	1.0 E+0	6.6 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Tungsten	2	2	100%	0.41	0.48	0.45	0.45	0.050	9	36	25%	0.26	0.60	0.10	0.17	0.15	9.8 E-3	5.1 E-2	1.0 E+0	8.7 E-3	NA	mg/kg	Insufficient data for statistical comparisons.
Uranium	2	2	100%	1.2	1.6	1.4	1.4	0.28	36	36	100%	0.64	2.2	1.2	1.2	0.34	2.1 E-1	4.6 E-1	1.0 E+0	1.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Vanadium	2	2	100%	27	28	27	27	0.50	36	36	100%	25	41	31	32	4.4	1.0 E+0	1.0 E+0	1.0 E+0	9.4 E-1	NA	mg/kg	Insufficient data for statistical comparisons.

Apppendix D
Summary of Background Metals Evaluation
Deep River Dataset

Chemical	River Site at >= 20 ft bgs (Deep) No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	River Background at >= 20 ft bgs (Deep) No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
Zinc	2	2	100%	32	44	38	38	7.9	36	36	100%	26	68	38	40	9.3	5.9 E-1	4.6 E-1	1.0 E+0	5.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Zirconium	2	2	100%	12	13	13	13	1.1	29	36	81%	10	21	15	13	6.6	5.4 E-1	1.0 E+0	1.0 E+0	8.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Radium-226	2	2	100%	0.91	1.3	1.1	1.1	0.26	28	28	100%	0.49	1.4	0.98	0.97	0.23	3.1 E-1	4.7 E-1	1.0 E+0	2.5 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Radium-228	2	2	100%	1.2	1.4	1.3	1.3	0.11	28	28	100%	0.88	1.8	1.4	1.3	0.24	5.3 E-1	1.0 E+0	1.0 E+0	6.0 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-228	2	2	100%	1.3	1.5	1.4	1.4	0.20	33	33	100%	0.94	1.7	1.4	1.4	0.17	4.5 E-1	4.5 E-1	1.0 E+0	4.4 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-230	2	2	100%	1.5	2.2	1.8	1.8	0.48	33	33	100%	0.55	1.9	1.0	1.0	0.30	1.3 E-1	6.1 E-2	5.7 E-2	1.6 E-2	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-232	2	2	100%	1.1	1.3	1.2	1.2	0.13	33	33	100%	0.90	1.7	1.4	1.3	0.20	8.5 E-1	1.0 E+0	1.0 E+0	8.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-233/234	2	2	100%	0.46	0.72	0.59	0.59	0.18	31	34	91%	0.64	2.1	1.0	1.1	0.30	9.4 E-1	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-235/236	0	2	0%	NA	NA	0.012	0.012	0.0013	19	34	56%	0.035	0.096	0.038	0.037	0.022	1.0 E+0	1.0 E+0	1.0 E+0	9.6 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-238	2	2	100%	0.33	0.57	0.45	0.45	0.17	30	34	88%	0.57	2.2	1.0	1.1	0.30	9.6 E-1	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Shallow Mixed Dataset

	Mixed Site at 0-20 ft bgs (Shallow)								Mixed Background at 0-20 ft bgs (Shallow)								*t* Test	Quantile Test	Slippage Test	WRS Test	Greater than		
Chemical	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	*p*	*p*	*p*	*p*	Bckrnd?	Units	Basis
Aluminum	2	2	100%	6410	8190	7300	7300	1259	11	11	100%	4840	10900	6180	6698	2069	3.2 E-1	4.2 E-1	1.0 E+0	8.4 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Antimony	2	2	100%	0.17	0.20	0.19	0.19	0.021	6	11	55%	0.13	0.44	0.16	0.17	0.11	3.8 E-1	1.0 E+0	1.0 E+0	6.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Arsenic	2	2	100%	3.5	4.6	4.1	4.1	0.78	11	11	100%	2.9	5.9	5.3	4.9	1.0	8.3 E-1	1.0 E+0	1.0 E+0	8.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Barium	2	2	100%	447	520	484	484	52	11	11	100%	211	836	424	468	190	4.1 E-1	1.0 E+0	1.0 E+0	2.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Beryllium	2	2	100%	0.48	0.57	0.53	0.53	0.064	11	11	100%	0.38	0.62	0.52	0.50	0.081	3.6 E-1	4.2 E-1	1.0 E+0	3.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Boron	0	2	0%	NA	NA	21	21	0	0	9	0%	NA	NA	3.2	3.2	0	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Cadmium	2	2	100%	0.090	0.11	0.10	0.10	0.014	2	11	18%	0.11	0.14	0.065	0.076	0.025	8.4 E-2	1.0 E+0	1.0 E+0	9.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Calcium	2	2	100%	24700	27000	25850	25850	1626	9	9	100%	8160	36400	16100	18640	10070	3.6 E-2	4.9 E-1	1.0 E+0	1.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (VI)	0	2	0%	NA	NA	0.50	0.50	0	0	9	0%	NA	NA	0.13	0.13	0.0025	3.6 E-19	1.0 E+0	NA	9.5 E-3	NA	mg/kg	Insufficient data for statistical comparisons.
Chromium (Total)	2	2	100%	8.0	11	9.7	9.7	2.4	11	11	100%	5.0	12	8.8	8.9	1.9	3.5 E-1	4.2 E-1	1.0 E+0	2.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Cobalt	2	2	100%	5.5	6.9	6.2	6.2	0.99	11	11	100%	5.1	12	6.1	6.9	2.3	7.4 E-1	1.0 E+0	1.0 E+0	4.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Copper	2	2	100%	13	14	13	13	0.64	11	11	100%	11	31	18	19	5.6	9.9 E-1	1.0 E+0	1.0 E+0	9.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Iron	2	2	100%	10900	13900	12400	12400	2121	11	11	100%	9180	14000	11200	11700	1710	3.6 E-1	4.2 E-1	1.0 E+0	3.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lead	2	2	100%	12	12	12	12	0.071	11	11	100%	8.9	21	9.9	13	4.7	6.9 E-1	1.0 E+0	1.0 E+0	2.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Lithium	2	2	100%	12	18	15	15	4.3	9	9	100%	9.1	15	12	12	1.9	2.5 E-1	4.9 E-1	1.8 E-1	1.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Magnesium	2	2	100%	6660	7370	7015	7015	502	11	11	100%	4580	9090	5450	6059	1348	7.1 E-2	4.2 E-1	1.0 E+0	1.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Manganese	2	2	100%	342	661	502	502	226	11	11	100%	345	1090	469	507	200	5.1 E-1	4.2 E-1	1.0 E+0	5.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Mercury	1	2	50%	0.0084	0.0084	0.0059	0.0059	0.0036	6	11	55%	0.0097	0.019	0.0097	0.010	0.0068	NA	1.0 E+0	1.0 E+0	8.9 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Molybdenum	2	2	100%	0.38	0.59	0.49	0.49	0.15	11	11	100%	0.22	1.3	0.90	0.86	0.35	9.6 E-1	1.0 E+0	1.0 E+0	9.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Nickel	2	2	100%	13	14	13	13	0.35	11	11	100%	8.9	14	11	11	1.3	1.3 E-3	3.8 E-2	1.0 E+0	3.8 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Niobium	0	2	0%	NA	NA	1.5	1.5	0	0	9	0%	NA	NA	1	1	0	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Palladium	2	2	100%	0.24	0.39	0.32	0.32	0.11	9	9	100%	0.14	0.48	0.22	0.27	0.11	3.2 E-1	4.9 E-1	1.0 E+0	1.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Phosphorus	2	2	100%	845	1060	953	953	152	9	9	100%	636	984	804	798	105	1.9 E-1	4.9 E-1	1.8 E-1	4.9 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Platinum	0	2	0%	NA	NA	0.02	0.02	0	0	9	0%	NA	NA	0.043	0.043	0	NA	NA	NA	NA	NA	mg/kg	Insufficient data for statistical comparisons.
Potassium	2	2	100%	1230	1470	1350	1350	170	9	9	100%	1240	1840	1380	1473	241	7.6 E-1	1.0 E+0	1.0 E+0	8.3 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Selenium	0	2	0%	NA	NA	0.16	0.16	0	8	11	73%	0.17	0.59	0.26	0.26	0.17	9.6 E-1	1.0 E+0	1.0 E+0	2.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Silicon	2	2	100%	825	970	898	898	103	9	9	100%	527	883	690	708	114	8.8 E-2	5.5 E-2	1.8 E-1	2.9 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Silver	2	2	100%	0.076	0.086	0.081	0.081	0.0071	2	11	18%	0.048	0.056	0.13	0.12	0.032	1.0 E+0	1.0 E+0	1.7 E-1	9.5 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Sodium	2	2	100%	386	539	463	463	108	9	9	100%	111	901	265	352	280	2.0 E-1	4.9 E-1	1.0 E+0	1.7 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Strontium	2	2	100%	159	258	209	209	70	9	9	100%	69	219	92	122	56	1.5 E-1	4.9 E-1	1.8 E-1	7.9 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Thallium	0	2	0%	NA	NA	0.10	0.10	0	7	11	64%	0.12	1.4	0.27	0.66	0.51	1.0 E+0	1.0 E+0	1.0 E+0	9.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Tin	0	2	0%	NA	NA	0.21	0.21	0	8	9	89%	0.20	0.34	0.22	0.24	0.075	8.8 E-1	1.0 E+0	1.0 E+0	1.7 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Titanium	2	2	100%	473	479	476	476	4.2	11	11	100%	200	398	244	272	70	9.6 E-7	3.8 E-2	1.3 E-2	1.5 E-2	NA	mg/kg	Insufficient data for statistical comparisons.
Tungsten	1	2	50%	0.22	0.22	0.16	0.16	0.085	0	9	0%	NA	NA	0.0088	0.0088	0	1.2 E-1	1.8 E-1	NA	8.3 E-4	NA	mg/kg	Insufficient data for statistical comparisons.
Uranium	2	2	100%	0.79	0.79	0.79	0.79	0	9	9	100%	0.43	0.84	0.71	0.68	0.14	2.0 E-2	1.0 E+0	1.0 E+0	1.2 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Vanadium	2	2	100%	23	35	29	29	8.8	11	11	100%	19	26	23	23	1.9	2.6 E-1	4.2 E-1	1.5 E-1	2.1 E-1	NA	mg/kg	Insufficient data for statistical comparisons.

Appendix D
Summary of Background Metals Evaluation
Shallow Mixed Dataset

Chemical	Mixed Site at 0-20 ft bgs (Shallow)								Mixed Background at 0-20 ft bgs (Shallow)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Zinc	2	2	100%	25	31	28	28	4.3	11	11	100%	21	52	25	31	11	6.9 E-1	1.0 E+0	1.0 E+0	3.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Zirconium	2	2	100%	11	11	11	11	0.071	9	9	100%	60	93	69	75	13	1.0 E+0	1.0 E+0	1.0 E+0	9.8 E-1	NA	mg/kg	Insufficient data for statistical comparisons.
Radium-226	2	2	100%	0.80	1.1	0.95	0.95	0.22	5	9	56%	0.58	0.93	0.76	0.74	0.13	1.0 E-1	4.9 E-1	1.8 E-1	7.9 E-2	NA	pCi/g	Insufficient data for statistical comparisons.
Radium-228	2	2	100%	1.4	1.9	1.6	1.6	0.32	3	3	100%	2.1	2.9	2.4	2.5	0.41	9.6 E-1	1.0 E+0	1.0 E+0	9.6 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-228	2	2	100%	1.3	1.6	1.4	1.4	0.20	11	11	100%	1.2	1.9	1.4	1.5	0.22	5.8 E-1	1.0 E+0	1.0 E+0	5.4 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-230	2	2	100%	1.0	1.4	1.2	1.2	0.27	11	11	100%	0.66	1.4	0.84	0.91	0.20	1.7 E-1	4.2 E-1	1.5 E-1	5.6 E-2	NA	pCi/g	Insufficient data for statistical comparisons.
Thorium-232	2	2	100%	1.1	1.5	1.3	1.3	0.27	11	11	100%	1.1	1.9	1.4	1.4	0.23	6.8 E-1	4.2 E-1	1.0 E+0	5.8 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-233/234	2	2	100%	0.22	0.23	0.23	0.23	0.0092	2	11	18%	0.76	0.79	0.76	0.74	0.13	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-235/236	0	2	0%	NA	NA	0.0015	0.0015	0.00046	5	11	45%	0.054	0.13	0.053	0.059	0.031	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.
Uranium-238	2	2	100%	0.17	0.22	0.20	0.20	0.034	11	11	100%	0.57	0.94	0.66	0.72	0.13	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NA	pCi/g	Insufficient data for statistical comparisons.

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Deep Mixed Dataset

Chemical	Mixed Site at >= 20 ft bgs (Deep)								Mixed Background at >= 20 ft bgs (Deep)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Aluminum	4	4	100%	7600	13400	9540	10020	2474	24	24	100%	7060	12300	9375	9514	1391	3.6 E-1	7.1 E-1	1.4 E-1	4.7 E-1	NO	mg/kg	Multiple tests
Antimony	4	4	100%	0.17	0.20	0.19	0.19	0.013	23	24	96%	0.12	0.26	0.16	0.17	0.043	3.5 E-2	1.0 E+0	1.0 E+0	1.0 E-1	NO	mg/kg	Multiple tests
Arsenic	4	4	100%	4.7	6.0	5.2	5.3	0.56	24	24	100%	4.4	10	7.0	7.1	1.4	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NO	mg/kg	Multiple tests
Barium	4	4	100%	560	869	663	689	130	24	24	100%	262	743	488	500	127	2.7 E-2	2.5 E-1	1.4 E-1	1.1 E-2	NO	mg/kg	Multiple tests
Beryllium	4	4	100%	0.44	0.65	0.50	0.52	0.090	24	24	100%	0.44	0.73	0.56	0.56	0.070	7.5 E-1	7.1 E-1	1.0 E+0	8.0 E-1	NO	mg/kg	Multiple tests
Boron	0	4	0%	NA	NA	10	10	0.025	3	24	13%	4.0	5.0	1.4	1.8	1.1	3.3 E-23	1.7 E-3	1.0 E+0	1.7 E-5	NO	mg/kg	ND at Site.
Cadmium	4	4	100%	0.065	0.080	0.077	0.075	0.0067	22	24	92%	0.051	0.13	0.097	0.087	0.032	9.5 E-1	1.0 E+0	1.0 E+0	9.6 E-1	NO	mg/kg	Multiple tests
Calcium	4	4	100%	13100	23600	22400	20380	4916	24	24	100%	0.43	40500	23100	22760	9662	7.6 E-1	1.0 E+0	1.0 E+0	7.2 E-1	NO	mg/kg	Multiple tests
Chromium (VI)	0	4	0%	NA	NA	0.50	0.50	0	2	14	14%	0.18	0.34	0.088	0.11	0.070	1.2 E-11	1.0 E+0	1.0 E+0	9.2 E-4	NO	mg/kg	ND at Site.
Chromium (Total)	4	4	100%	7.5	15	8.0	9.6	3.5	24	24	100%	1.1	18	15	14	3.5	9.6 E-1	1.0 E+0	1.0 E+0	9.9 E-1	NO	mg/kg	Multiple tests
Cobalt	4	4	100%	3.9	5.0	4.2	4.3	0.48	24	24	100%	4.7	13	7.5	7.5	1.5	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Copper	4	4	100%	9.0	13	11	11	1.7	24	24	100%	9.9	19	15	15	2.1	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Iron	4	4	100%	9600	10900	10140	10190	577	24	24	100%	11900	17200	15400	15120	1528	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Lead	4	4	100%	9.7	14	12	12	1.7	24	24	100%	7.4	21	11	12	2.9	5.1 E-1	7.1 E-1	1.0 E+0	3.1 E-1	NO	mg/kg	Multiple tests
Lithium	4	4	100%	14	17	15	15	1.463	24	24	100%	13	33	21	21	4.1	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Magnesium	4	4	100%	5230	6390	5725	5768	477	24	24	100%	5920	12800	9435	9386	1697	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Manganese	4	4	100%	263	413	302	320	69	24	24	100%	158	836	328	368	189	8.2 E-1	7.1 E-1	1.0 E+0	5.3 E-1	NO	mg/kg	Multiple tests
Mercury	1	4	25%	0.0078	0.0078	0.0033	0.0045	0.0022	10	24	42%	0.0076	0.025	0.0033	0.0068	0.0054	NA	1.0 E+0	1.0 E+0	8.1 E-1	NO	mg/kg	Low detection frequency; site and background datasets similar.
Molybdenum	4	4	100%	0.31	0.59	0.45	0.45	0.12	24	24	100%	0.28	1.8	0.56	0.61	0.30	9.6 E-1	1.0 E+0	1.0 E+0	9.1 E-1	NO	mg/kg	Multiple tests
Nickel	4	4	100%	9.1	10	9.3	9.5	0.61	24	24	100%	9.7	17	15	15	1.9	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Niobium	0	4	0%	NA	NA	0.76	0.76	0	3	24	13%	2.8	3.6	0.76	1.0	0.80	9.6 E-1	1.0 E+0	1.0 E+0	7.7 E-1	NO	mg/kg	Multiple tests
Palladium	4	4	100%	0.33	0.81	0.57	0.57	0.20	24	24	100%	0.41	1.1	0.71	0.69	0.20	8.4 E-1	1.0 E+0	1.0 E+0	8.0 E-1	NO	mg/kg	Multiple tests
Phosphorus	4	4	100%	598	828	622	668	109	24	24	100%	594	1200	920	930	124	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Platinum	0	4	0%	NA	NA	0.02	0.02	0	0	24	0%	NA	NA	0.02	0.02	0	NA	NA	NA	NA	NO	mg/kg	ND in both datasets
Potassium	4	4	100%	2100	3000	2430	2490	426	24	24	100%	1220	3440	1960	2038	550	6.1 E-2	2.5 E-1	1.0 E+0	3.8 E-2	NO	mg/kg	Multiple tests
Selenium	0	4	0%	NA	NA	0.32	0.32	0	0	24	0%	NA	NA	0.32	0.32	0	NA	NA	NA	NA	NO	mg/kg	ND in both datasets
Silicon	4	4	100%	974	1120	1052	1050	82	24	24	100%	109	516	193	213	85	1.7 E-5	1.7 E-3	4.9 E-5	8.1 E-4	YES	mg/kg	Multiple tests
Silver	4	4	100%	0.056	0.12	0.089	0.089	0.026	24	24	100%	0.077	0.35	0.11	0.14	0.070	9.8 E-1	1.0 E+0	1.0 E+0	9.5 E-1	NO	mg/kg	Multiple tests
Sodium	4	4	100%	677	1650	1190	1176	430	24	24	100%	235	537	319	337	78	1.5 E-2	1.7 E-3	4.9 E-5	8.1 E-4	YES	mg/kg	Multiple tests
Strontium	4	4	100%	231	564	392	395	139	24	24	100%	153	362	219	230	53	4.8 E-2	3.8 E-2	1.6 E-2	9.1 E-3	YES	mg/kg	t-Test and Quantile.
Thallium	0	4	0%	NA	NA	0.2	0.2	0	0	24	0%	NA	NA	0.2	0.2	0	NA	NA	NA	NA	NO	mg/kg	ND in both datasets
Tin	0	4	0%	NA	NA	0.21	0.21	0	15	24	63%	0.43	0.60	0.45	0.32	0.24	9.9 E-1	1.0 E+0	1.0 E+0	7.9 E-1	NO	mg/kg	ND at Site.
Titanium	4	4	100%	441	468	445	450	12	24	24	100%	323	638	500	495	71	1.0 E+0	1.0 E+0	1.0 E+0	9.7 E-1	NO	mg/kg	Multiple tests
Tungsten	0	4	0%	NA	NA	0.10	0.10	0	15	24	63%	0.24	0.76	0.26	0.28	0.19	1.0 E+0	1.0 E+0	1.0 E+0	9.8 E-1	NO	mg/kg	ND at Site.
Uranium	4	4	100%	0.86	0.98	0.92	0.92	0.057	24	24	100%	0.75	1.6	1.1	1.1	0.18	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NO	mg/kg	Multiple tests
Vanadium	4	4	100%	22	27	22	23	2.7	24	24	100%	29	45	39	39	4.2	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests

Appendix D
Summary of Background Metals Evaluation
Deep Mixed Dataset

Chemical	Mixed Site at >= 20 ft bgs (Deep)								Mixed Background at >= 20 ft bgs (Deep)								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Zinc	4	4	100%	26	28	27	27	1.0	24	24	100%	27	46	33	33	4.4	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	mg/kg	Multiple tests
Zirconium	4	4	100%	10	11	11	11	0.38	15	24	63%	7.7	18	12	9.0	7.3	1.1 E-1	1.0 E+0	1.0 E+0	5.8 E-1	NO	mg/kg	Multiple tests
Radium-226	4	4	100%	0.70	1.3	0.75	0.87	0.28	14	14	100%	0.39	1.3	0.98	1.0	0.25	8.0 E-1	7.7 E-1	1.0 E+0	9.3 E-1	NO	pCi/g	Multiple tests
Radium-228	4	4	100%	1.3	1.5	1.4	1.4	0.11	13	14	93%	1.1	1.8	1.3	1.3	0.32	2.1 E-1	7.7 E-1	1.0 E+0	2.4 E-1	NO	pCi/g	Multiple tests
Thorium-228	4	4	100%	1.2	1.6	1.3	1.3	0.22	23	23	100%	1.1	1.9	1.6	1.6	0.20	9.5 E-1	1.0 E+0	1.0 E+0	9.7 E-1	NO	pCi/g	Multiple tests
Thorium-230	4	4	100%	1.1	1.9	1.2	1.4	0.36	23	23	100%	0.60	1.5	1.1	1.1	0.20	9.8 E-2	2.7 E-1	1.5 E-1	4.1 E-2	NO	pCi/g	Multiple tests
Thorium-232	4	4	100%	1.1	1.4	1.1	1.2	0.14	23	23	100%	1.1	1.9	1.5	1.5	0.21	1.0 E+0	1.0 E+0	1.0 E+0	9.9 E-1	NO	pCi/g	Multiple tests
Uranium-233/234	4	4	100%	0.23	1.0	0.31	0.46	0.36	7	11	64%	0.98	1.3	1.0	1.1	0.12	9.6 E-1	1.0 E+0	1.0 E+0	9.9 E-1	NO	pCi/g	Multiple tests
Uranium-235/236	1	4	25%	0.027	0.027	0.0035	0.0084	0.013	10	11	91%	0.029	0.062	0.039	0.041	0.013	1.0 E+0	1.0 E+0	1.0 E+0	1.0 E+0	NO	pCi/g	Low detection frequency; max background greater than site max.
Uranium-238	4	4	100%	0.21	1.0	0.24	0.43	0.41	7	11	64%	0.90	1.2	1.0	1.0	0.070	9.4 E-1	1.0 E+0	1.0 E+0	9.8 E-1	NO	pCi/g	Multiple tests

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Upper Muddy Creek Formation (UMCf) Dataset

Chemical	UMCf Site								UMCf Background								*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation							
Aluminum	10	10	100%	7090	18100	13700	13410	3967	24	24	100%	3190	19700	9335	9847	4171	1.5 E-2	6.0 E-2	1.0 E+0	1.6 E-2	NO	mg/kg	Quantile and Slippage; site and background datasets similar.
Antimony	6	10	60%	0.15	0.55	0.20	0.25	0.20	23	24	96%	0.066	0.34	0.16	0.17	0.064	1.3 E-1	1.5 E-1	6.8 E-2	2.3 E-1	NO	mg/kg	Multiple tests
Arsenic	10	10	100%	5.6	27	12	13	5.9	24	24	100%	2.1	25	7.7	8.8	5.4	3.7 E-2	2.3 E-1	2.9 E-1	1.5 E-2	NO	mg/kg	Multiple tests
Barium	10	10	100%	39	873	124	195	253	24	24	100%	65	620	203	264	166	7.8 E-1	8.3 E-1	2.9 E-1	9.8 E-1	NO	mg/kg	Multiple tests
Beryllium	10	10	100%	0.38	1.1	0.84	0.79	0.26	24	24	100%	0.17	1.1	0.59	0.56	0.24	1.2 E-2	8.8 E-3	1.0 E+0	9.0 E-3	YES	mg/kg	Multiple tests
Boron	6	10	60%	11	29	19	20	7.2	7	24	29%	4.4	23	1.4	5.7	8.0	5.2 E-5	6.0 E-2	5.5 E-4	2.4 E-6	YES	mg/kg	Low detection frequency; site max, mean and median greater than background.
Cadmium	6	10	60%	0.066	0.55	0.37	0.42	0.43	18	24	75%	0.060	0.20	0.099	0.083	0.054	1.8 E-2	2.3 E-1	4.9 E-3	3.9 E-4	YES	mg/kg	Multiple tests
Calcium	10	10	100%	5280	153000	27200	51500	54110	24	24	100%	4190	38600	22150	22610	10060	6.4 E-2	2.3 E-1	2.0 E-2	8.1 E-2	NO	mg/kg	Multiple tests
Chromium (VI)	1	10	10%	0.25	0.25	0.40	0.42	0.16	2	23	9%	0.18	0.19	0.090	0.098	0.028	6.3 E-5	6.8 E-1	5.0 E-2	2.6 E-6	YES	mg/kg	Low detection frequency; site max, mean and median greater than background.
Chromium (Total)	10	10	100%	11	42	23	23	9.8	24	24	100%	2.9	28	13	13	7.5	5.4 E-3	6.0 E-2	2.0 E-2	2.6 E-3	YES	mg/kg	Multiple tests
Cobalt	10	10	100%	2.9	11	7.6	7.2	2.4	24	24	100%	1.6	9.7	6.5	5.8	2.7	6.9 E-2	5.4 E-1	2.9 E-1	5.2 E-2	NO	mg/kg	Multiple tests
Copper	10	10	100%	6.1	39	22	21	10	24	24	100%	4.1	21	14	12	5.4	1.4 E-2	8.8 E-3	1.6 E-4	2.3 E-3	YES	mg/kg	Multiple tests
Iron	10	10	100%	6610	20900	16400	15740	5074	24	24	100%	3620	20100	12800	12550	5283	5.9 E-2	5.4 E-1	2.0 E-2	5.2 E-2	NO	mg/kg	Multiple tests
Lead	10	10	100%	5.4	13	8.5	9.1	2.7	24	24	100%	4.4	16	11	11	3.5	9.3 E-1	9.8 E-1	1.0 E+0	9.2 E-1	NO	mg/kg	Multiple tests
Lithium	10	10	100%	32	131	52	61	30	24	24	100%	18	189	32	53	52	2.8 E-1	6.0 E-2	1.0 E+0	1.8 E-2	NO	mg/kg	Multiple tests
Magnesium	10	10	100%	15200	75000	36850	41640	21990	24	24	100%	2780	31000	10250	11300	6175	8.7 E-4	2.1 E-5	2.2 E-5	1.6 E-5	YES	mg/kg	Multiple tests
Manganese	10	10	100%	252	462	323	331	70	24	24	100%	126	786	295	307	157	2.7 E-1	5.4 E-1	1.0 E+0	1.8 E-1	NO	mg/kg	Multiple tests
Mercury	3	10	30%	0.0086	0.012	0.011	0.014	0.0093	5	20	25%	0.0080	0.012	0.0033	0.0050	0.0031	NA	5.5 E-1	1.0 E+0	2.5 E-3	NO	mg/kg	Low detection frequency; site and background datasets similar.
Molybdenum	10	10	100%	0.34	3.8	1.3	1.6	1.2	23	24	96%	0.12	1.1	0.50	0.50	0.27	1.0 E-2	8.8 E-3	1.6 E-4	1.1 E-3	YES	mg/kg	Multiple tests
Nickel	10	10	100%	9.9	23	20	18	5.0	24	24	100%	4.5	31	14	14	6.3	2.7 E-2	6.0 E-2	1.0 E+0	2.8 E-2	NO	mg/kg	Multiple tests
Niobium	0	10	0%	NA	NA	0.76	1.6	1.2	1	24	4%	4.0	4.0	0.76	0.90	0.66	6.6 E-2	6.7 E-2	1.0 E+0	9.9 E-3	NO	mg/kg	ND at Site.
Palladium	10	10	100%	0.18	0.73	0.38	0.42	0.19	24	24	100%	0.16	1.0	0.62	0.55	0.24	9.5 E-1	9.8 E-1	1.0 E+0	9.3 E-1	NO	mg/kg	Multiple tests
Phosphorus	10	10	100%	434	1350	949	894	283	24	24	100%	299	1370	843	794	295	1.8 E-1	8.3 E-1	1.0 E+0	2.5 E-1	NO	mg/kg	Multiple tests
Platinum	0	10	0%	NA	NA	0.010	0.034	0.031	2	24	8%	0.027	0.033	0.010	0.012	0.0057	2.6 E-2	4.8 E-2	1.0 E+0	1.8 E-2	NO	mg/kg	ND at Site.
Potassium	10	10	100%	2160	7340	3715	3837	1593	24	24	100%	1030	6190	2820	3070	1421	1.0 E-1	6.0 E-2	2.9 E-1	9.0 E-2	NO	mg/kg	Multiple tests
Selenium	2	10	20%	0.30	0.52	0.16	0.25	0.13	0	24	0%	NA	NA	0.16	0.16	0.0082	2.8 E-2	2.0 E-2	NA	9.9 E-2	YES	mg/kg	ND in background.
Silicon	10	10	100%	548	1620	990	1040	304	24	24	100%	188	1000	304	373	207	1.4 E-5	2.1 E-5	9.1 E-4	1.2 E-5	YES	mg/kg	Multiple tests
Silver	9	10	90%	0.11	0.33	0.20	0.21	0.082	24	24	100%	0.051	0.82	0.14	0.21	0.18	4.8 E-1	4.4 E-1	1.0 E+0	8.7 E-2	NO	mg/kg	Multiple tests
Sodium	10	10	100%	541	1310	1050	1037	240	24	24	100%	259	1200	460	610	290	1.2 E-4	3.1 E-2	2.0 E-2	4.7 E-4	YES	mg/kg	Multiple tests
Strontium	10	10	100%	118	555	166	203	128	24	24	100%	69	324	224	207	71	5.3 E-1	9.8 E-1	2.9 E-1	9.5 E-1	NO	mg/kg	Multiple tests
Thallium	2	10	20%	0.28	0.53	0.41	0.65	0.91	0	24	0%	NA	NA	0.10	0.10	0.0051	4.4 E-2	1.6 E-4	NA	9.0 E-5	YES	mg/kg	ND in background.
Tin	6	10	60%	0.58	0.90	0.68	0.64	0.23	20	24	83%	0.24	0.96	0.52	0.47	0.28	3.9 E-2	6.0 E-2	1.0 E+0	1.9 E-3	NO	mg/kg	Multiple tests
Titanium	10	10	100%	260	1190	647	649	277	24	24	100%	175	1000	565	503	200	7.6 E-2	6.0 E-2	2.9 E-1	3.2 E-2	NO	mg/kg	Multiple tests
Tungsten	4	10	40%	0.28	0.93	0.25	0.33	0.31	5	24	21%	0.26	0.58	0.10	0.16	0.13	6.4 E-2	2.3 E-1	8.0 E-2	1.1 E-2	YES	mg/kg	Low detection frequency; site max, mean and median greater than background.
Uranium	10	10	100%	2.2	14	3.6	4.7	3.5	24	24	100%	0.31	4.4	1.2	1.3	0.85	7.0 E-3	2.1 E-5	8.0 E-2	1.3 E-5	YES	mg/kg	Multiple tests
Vanadium	10	10	100%	22	61	37	38	12	24	24	100%	10	46	33	31	13	5.8 E-2	2.3 E-1	4.5 E-3	8.1 E-2	NO	mg/kg	Multiple tests

Appendix D
Summary of Background Metals Evaluation
Upper Muddy Creek Formation (UMCf) Dataset

Chemical	UMCf Site No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	UMCf Background No. of Detects	Total Samples	% Detects	Minimum Detect	Maximum Detect	Median	Mean	Standard Deviation	*t* Test *p*	Quantile Test *p*	Slippage Test *p*	WRS Test *p*	Greater than Bckrnd?	Units	Basis
Zinc	10	10	100%	24	177	52	61	44	24	24	100%	16	61	34	34	12	4.2 E-2	8.8 E-3	8.0 E-2	4.3 E-3	YES	mg/kg	Site max > 2 times max background.
Zirconium	9	10	90%	12	40	26	24	9.6	24	24	100%	6.2	37	18	20	8.5	1.1 E-1	2.3 E-1	2.9 E-1	4.4 E-2	NO	mg/kg	Multiple tests
Radium-226	10	10	100%	1.1	2.9	1.7	1.8	0.67	14	18	78%	0.75	1.6	1.0	1.0	0.21	8.9 E-4	3.3 E-3	2.6 E-3	8.8 E-5	YES	pCi/g	Multiple tests
Radium-228	9	10	90%	0.54	1.7	1.4	1.3	0.36	17	18	94%	0.99	1.6	1.3	1.3	0.17	5.2 E-1	1.8 E-1	1.2 E-1	3.2 E-1	NO	pCi/g	Multiple tests
Thorium-228	10	10	100%	0.47	1.7	1.4	1.3	0.42	24	24	100%	1.0	2.2	1.3	1.4	0.25	7.9 E-1	8.3 E-1	1.0 E+0	5.8 E-1	NO	pCi/g	Multiple tests
Thorium-230	10	10	100%	1.2	9.6	2.4	2.9	2.4	24	24	100%	0.50	2.1	0.98	1.0	0.33	1.9 E-2	2.1 E-5	1.6 E-4	8.2 E-6	YES	pCi/g	Multiple tests
Thorium-232	10	10	100%	0.47	18	1.2	2.8	5.4	24	24	100%	0.97	2.1	1.3	1.3	0.23	2.1 E-1	5.4 E-1	2.9 E-1	7.9 E-1	NO	pCi/g	Multiple tests
Uranium-233/234	10	10	100%	0.44	2.7	1.4	1.6	0.82	12	20	60%	0.63	1.8	1.0	1.1	0.25	1.5 E-2	5.6 E-2	7.7 E-3	2.0 E-1	YES	pCi/g	t-Test and slippage.
Uranium-235/236	7	10	70%	0.029	0.17	0.044	0.071	0.049	14	20	70%	0.029	0.10	0.039	0.043	0.024	9.0 E-2	2.3 E-1	3.0 E-2	5.7 E-2	NO	pCi/g	Multiple tests
Uranium-238	10	10	100%	0.34	2.7	1.3	1.6	0.88	11	20	55%	0.84	1.8	1.0	1.1	0.22	1.5 E-2	5.6 E-2	7.7 E-3	2.1 E-1	YES	pCi/g	t-Test and slippage.

Note: Summary and background comparison statistics were performed using one-half the detection limit for metals and using GISdT® (Neptune and Company 2007).
BOLD with Highlight indicates Site concentrations are greater than background.
WRS = Wilcoxon Rank Sum Test with the Gehan Modification
mg/kg - milligrams per kilogram
pCi/g - picoCuries per gram
Note: minimum and maximum values are for detected analytes only; mean and median values include non-detects.
p = significance level (compared to 0.025) (see text).
Greater than Background (YES/NO) is based on test results - see Basis column.

Appendix D
Summary of Background Metals Evaluation
Borings within each Dataset

Depth	Dataset	Borings
< 20 ft	McC Shallow	AA-UW-1 AA-UW-2 AA-UW-3 AA-UW-4 SB-01-B SB-27-A
< 20 ft	Mixed Shallow	AA-UW-5
< 20 ft	River Shallow	AA-UW-6

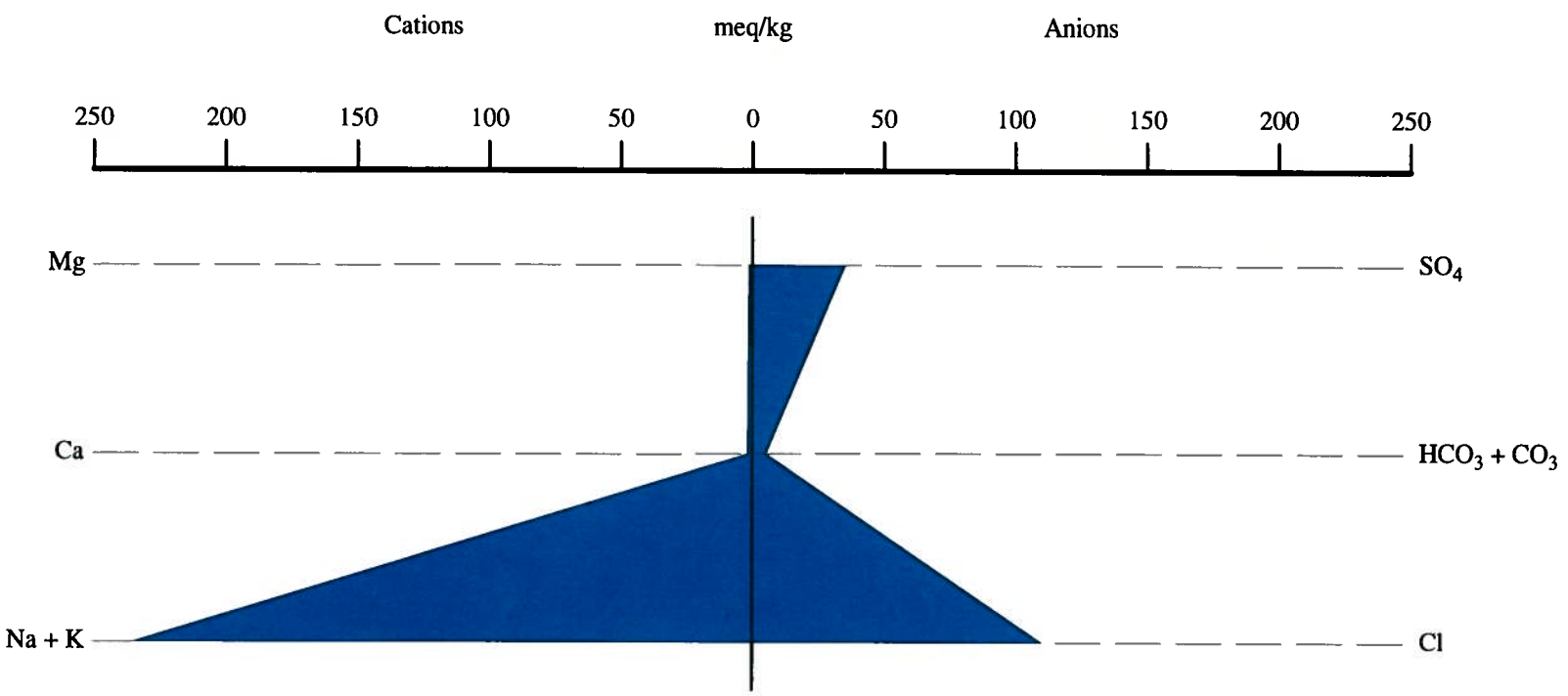
Depth	Dataset	Wells
>= 20 ft	McC Deep	AA-UW-1 AA-UW-2 AA-UW-3 AA-UW-4 SB-01-B SB-27-A
>= 20 ft	Mixed Deep	AA-UW-5
>= 20 ft	River Deep	AA-UW-6

Depth	Dataset	Wells
> contact	TMC	AA-UW-1 AA-UW-3 AA-UW-4 AA-UW-5 AA-UW-6 SB-01-B SB-27-A

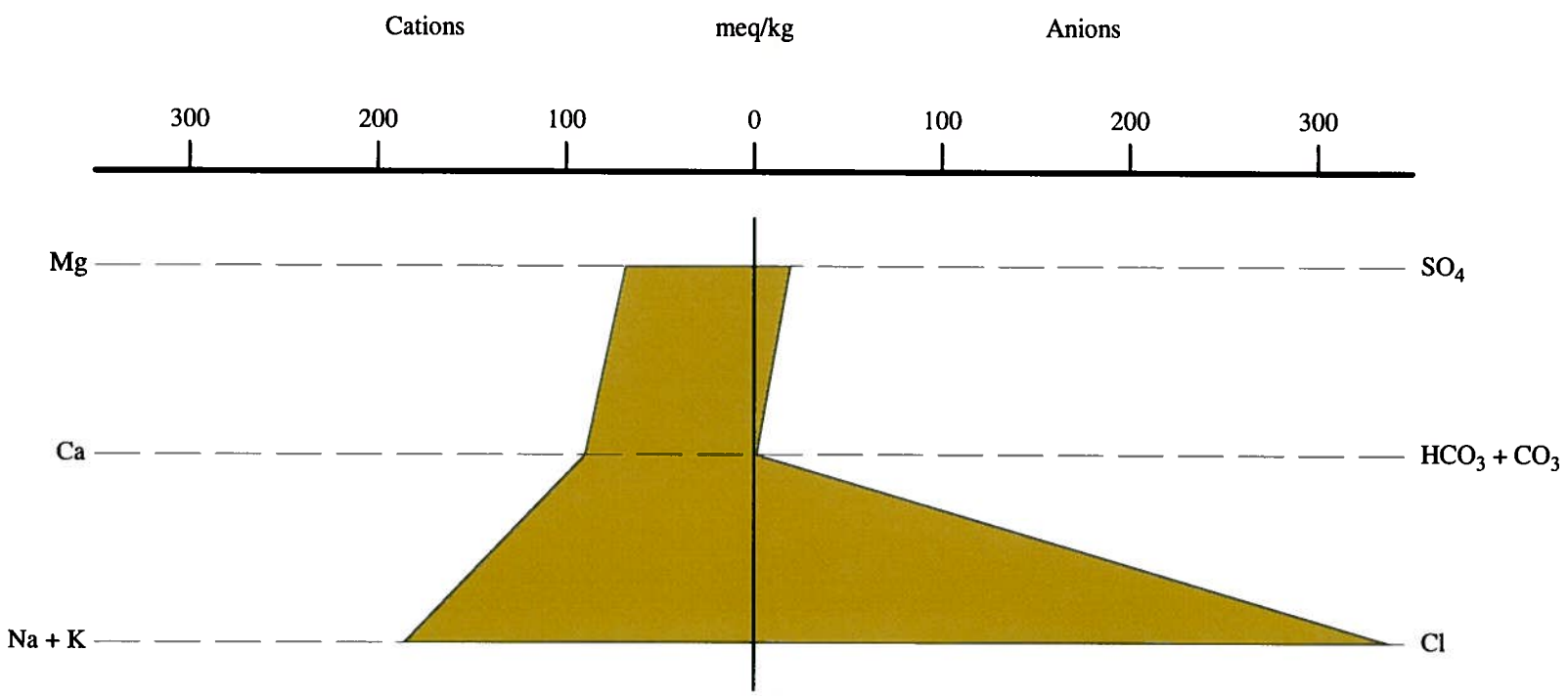
Appendix E

Stiff Polygonal Diagrams
Shallow Zone Layer 2 Wells
(TIMET)

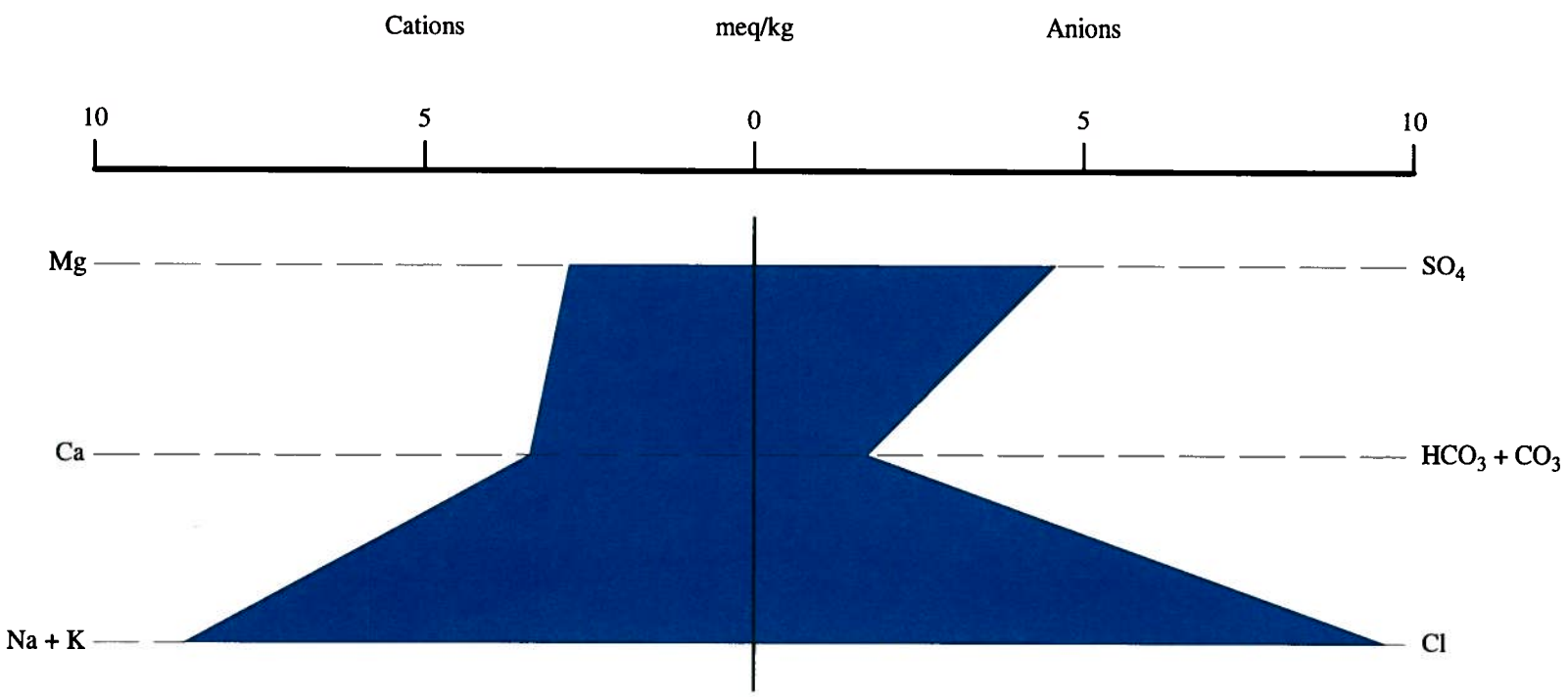
CMT-201 Stiff Diagram



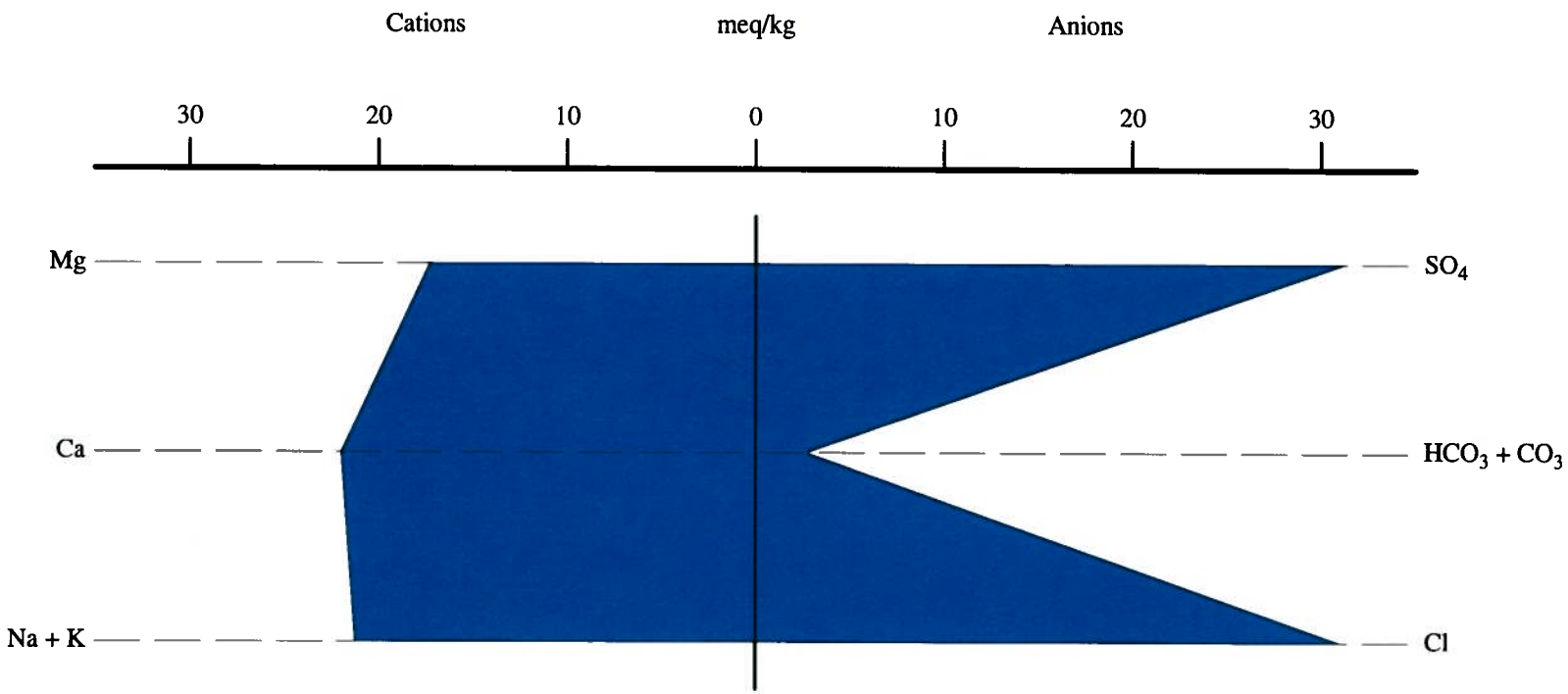
CMT-202 Stiff Diagram



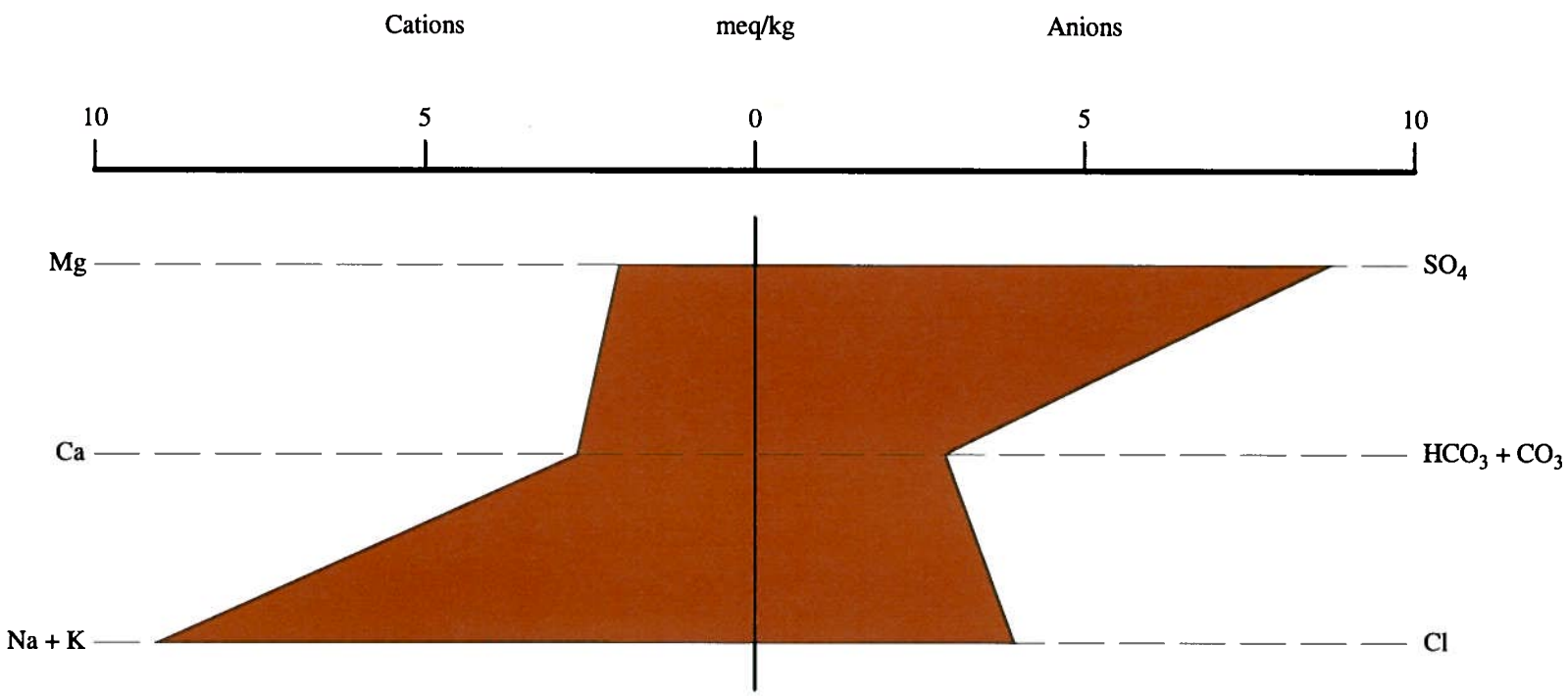
CMT-203 Stiff Diagram



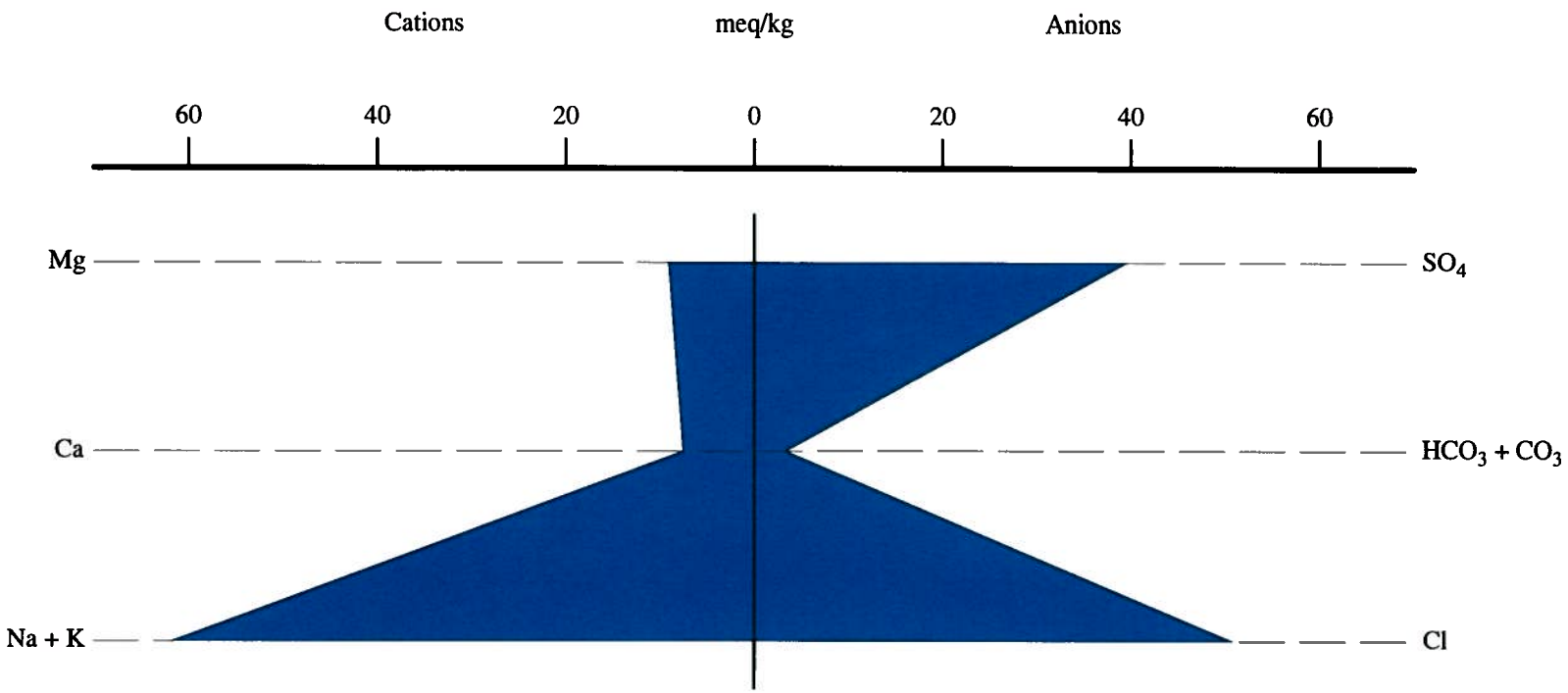
CMT-302 Stiff Diagram



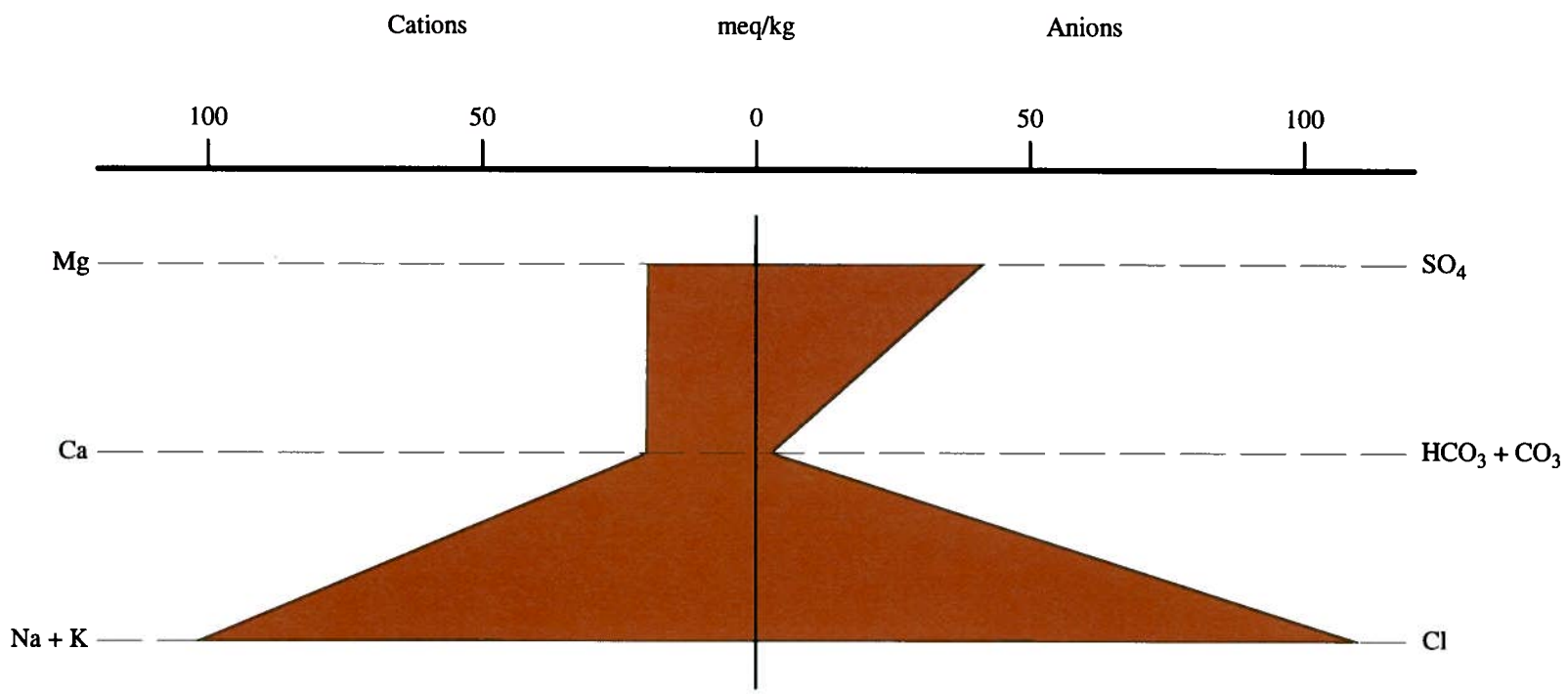
CMT-303 Stiff Diagram



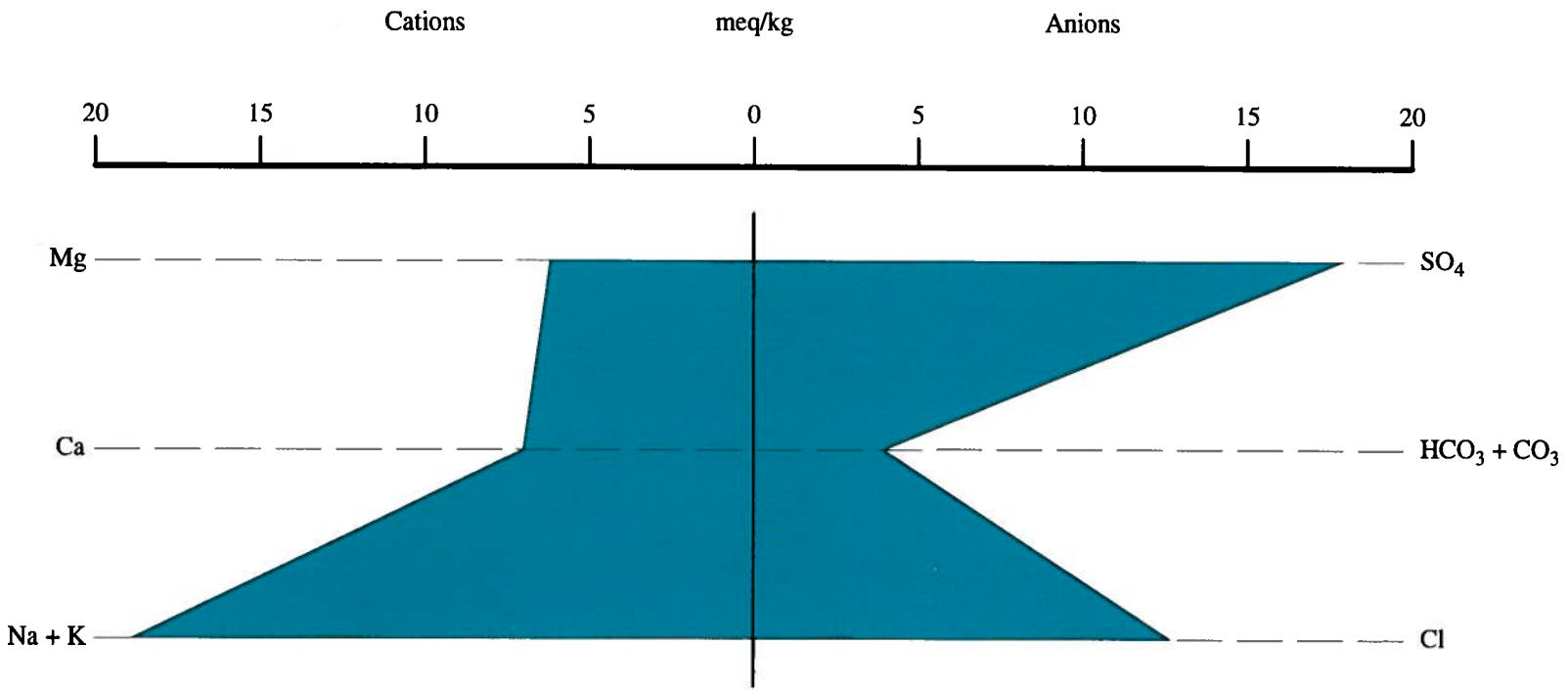
CMT-501 Stiff Diagram



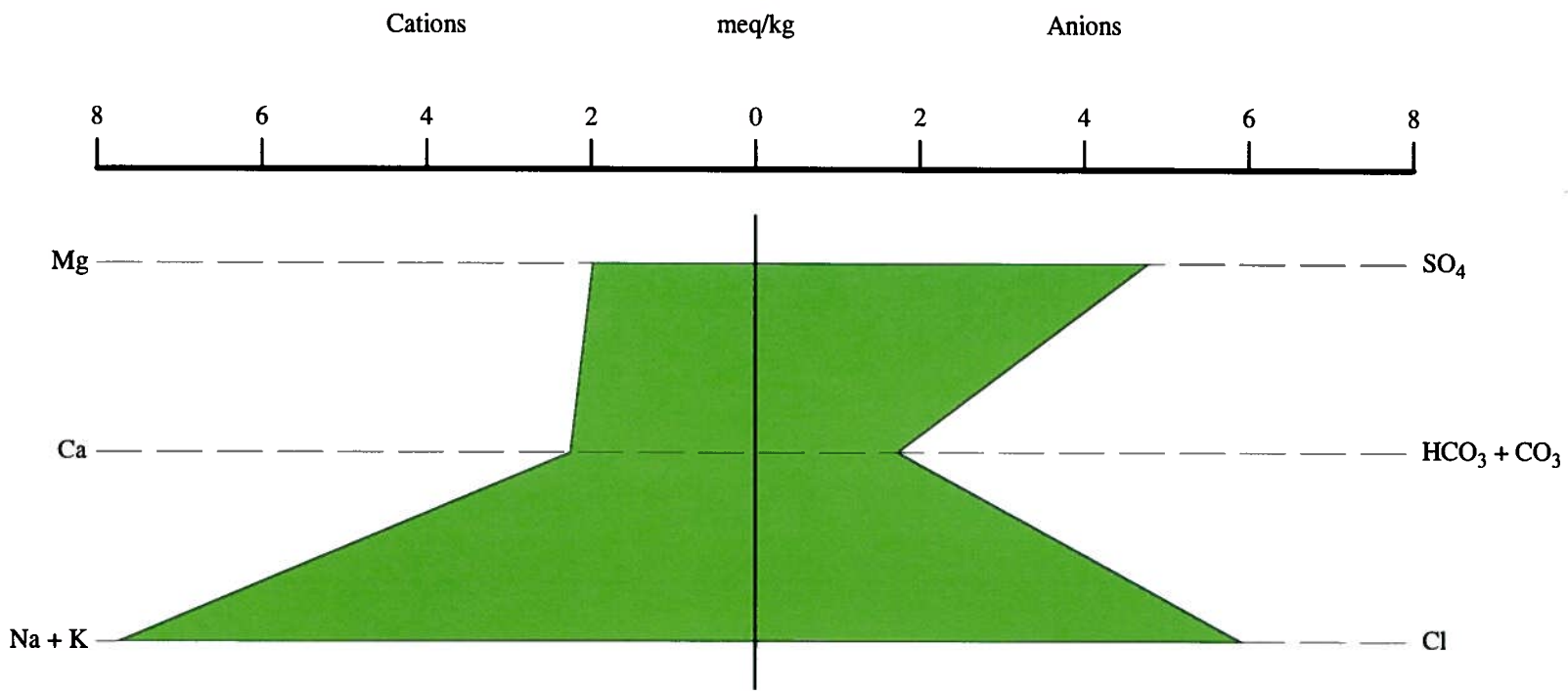
CMT-502 Stiff Diagram



CMT-503 Stiff Diagram



CMT-504 Stiff Diagram



Appendix F

Summary of Cation-Anion Balance and Related Calculations (2009)

Summary of Cation-Anion Balance and Related Calculations
2009 Groundwater Sampling Event - BMI Common Areas - Eastside

Well	Zone	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations									
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)
																(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)
AA-01	Shallow Upgradient	6.9	471	142	364	7.21	93.0		1640	719	1.2	10.9	1.9 D	3800	4560	23.5	11.7	15.8	0.184	1.52	0.00	34.1	20.3	0.063	0.176	0.019
AA-07	Shallow	7.0	266	87.8 J	224 J	42.1	84.0		956	261	0.68	10.6	0.4 D	2500	2800	13.3	7.22	9.74	1.08	1.38	0.00	19.9	7.35	0.036	0.171	4.0E-03
AA-08	Shallow	7.2	454	208	657	32.9	163		1820	975	1.3	6.20	3.3 B D	3500	5840	22.7	17.1	28.6	0.841	2.67	0.00	37.9	27.5	0.068	0.100	0.033
AA-09	Shallow	7.5	538	294	923 J	30.5	69.0		2870	1090	0.54 B	14.4	6 D	6600	7390	26.8	24.2	40.1	0.780	1.13	0.00	59.8	30.7	0.028	0.233	0.060
AA-10	Shallow	7.2	404	200	633 J	36.2	148		1800	1030	1	7.40	4.3 D	4110	5890	20.2	16.4	27.5	0.926	2.43	0.00	37.5	29.0	0.053	0.120	0.043
AA-13	Shallow	7.1	260	114	439	23.2	199		1590	371 J	0.76	49.6	0.097 B D	1800	3630	13.0	9.38	19.1	0.593	3.26	0.00	33.1	10.5	0.040	0.801	9.7E-04
AA-18	Shallow	7.5	110	57.2	156 J	16.8	95.0		401	208	0.68	10.8	0.11 D	350 U	1720	5.49	4.70	6.79	0.430	1.56	0.00	8.35	5.86	0.036	0.174	1.1E-03
AA-20	Shallow	6.9	556	235	898 J	44.2	78.0 J		2540	1100	0.22	14.7	5.3 D	6400	7640 J	27.7	19.3	39.1	1.13	1.28	0.00	52.9	31.0	0.012	0.237	0.053
AA-21	Shallow	7.2	512	299	720 J	83.3	189		2800	994	1.6 B	7.40	0.052 B D	5600	7100	25.5	24.6	31.3	2.13	3.10	0.00	58.3	28.0	0.084	0.120	5.2E-04
AA-22	Shallow	7.3	692	133	353	46	68.8		1900	677	0.21	16.6	1.7	3600	4800	34.5	10.9	15.4	1.18	1.13	0.00	39.6	19.1	0.011	0.268	0.017
AA-23R	Shallow	7.4	635	159	408 J	62.7	90.4 J		1880	928	0.48	26.6	1.9 B D	2400	6010 J	31.7	13.1	17.7	1.60	1.48	0.00	39.1	26.1	0.025	0.430	0.019
AA-26	Shallow	7.5	252	90.9	356 J	44.1	70.0 J		1100	355	0.79	12.1	0.049 B D	600	3420 J	12.6	7.48	15.5	1.13	1.15	0.00	22.9	10.0	0.042	0.195	4.9E-04
AA-27	Shallow Upgradient	7.6	513	192	535	8.58	126		2320	422	2	12.5	0.23 D	3300	4980	25.6	15.8	23.3	0.219	2.06	0.00	48.3	11.9	0.11	0.202	2.3E-03
AA-30	Shallow	7.1	643	347	721 J	180	115 J		2630	1620	0.11	35.6	2.5 B D	5000	8610 J	32.1	28.5	31.4	4.60	1.88	0.00	54.8	45.6	5.8E-03	0.575	0.025
AA-UW-1	Shallow Upgradient	5.8	541	219	353	8.55	90.0		2150	415 J	1.2	5.00	0.63 D	3100	4680	27.0	18.0	15.4	0.219	1.47	0.00	44.8	11.7	0.063	0.0808	6.3E-03
AA-UW-2	Shallow Upgradient	7.3	378	191	461 J	7.88	120		1970	512	0.9	10.2	0.099 D	4200	4740	18.9	15.7	20.1	0.202	1.97	0.00	41.0	14.4	0.047	0.165	9.9E-04
AA-UW-3	Shallow Upgradient	7.7	338	221	979	16.1	81.0		3280	267	1	8.90	0.065 D	3500	9870	16.9	18.2	42.6	0.412	1.33	0.00	68.3	7.52	0.053	0.144	6.5E-04
AA-UW-4	Shallow Upgradient	7.6	401	194	919	16.0	78.0		2920	304	0.81	12.6	0.077 D	4300	5700	20.0	16.0	40.0	0.409	1.28	0.00	60.8	8.56	0.043	0.204	7.7E-04
AA-UW-4(FD)	Shallow Upgradient	7.6	397	190	914	16.1	81.0		2930	306	0.82	12.7	0.075 D	3700	5710	19.8	15.6	39.8	0.412	1.33	0.00	61.0	8.62	0.043	0.205	7.5E-04
AA-UW-5	Shallow Upgradient	7.6	90.2	45.4	119	9.03	116 J		222	160	0.66	13.3	0.051 D	700	1400 J	4.50	3.73	5.18	0.231	1.90	0.00	4.62	4.51	0.035	0.215	5.1E-04
AA-UW-5(FD)	Shallow Upgradient	7.5	91.8	46.9	122	9.08	116 J		227	166	0.66	12.9	0.056 D	600	1390 J	4.58	3.86	5.31	0.232	1.90	0.00	4.73	4.68	0.035	0.208	5.6E-04
AA-UW-6	Shallow Upgradient	7.6	384	151	342	62.4	66.0		2240	201	0.57	8.80	0.05 D	3700	4280	19.2	12.4	14.9	1.60	1.08	0.00	46.6	5.66	0.030	0.142	5.0E-04
BEC-6	Shallow	7.0	575 L	256	720	48.4	58.0 J		2400 J	1570	U	29.5	15 D	7300	5980 J	28.7	21.1	31.3	1.24	0.951	0.00	50.0	44.2	0.0	0.476	0.15
BEC-9	Shallow	7.1	716	283	514	49.2	134		1920	1290	0.62	40.4	0.27	5300	6650	35.7	23.3	22.4	1.26	2.20	0.00	40.0	36.3	0.033	0.653	2.7E-03
COH-1	Middle	8.2	490 L	8190	18700	6380	100 J		44600 J	24800	U	U	U	117000	155000 J	24.5	674	813	163	1.64	0.00	929	699	0.0	0.00	0.0
COH-2	Middle	7.5	560	7400	17000 L	4830	95.0		35400	24600 J	U	U	U	89900	85000	27.9	609	739	124	1.56	0.00	737	693	0.0	0.00	0.0
COH-2A	Shallow	7.3	332	207	1130 J	45.9	350 J		1980	1410	0.76	1.10	5.4 D	3300	7510 J	16.6	17.0	49.2	1.17	5.74	0.00	41.2	39.7	0.040	0.0178	0.054
DBMW-1	Shallow	7.1	587	269	759	59.5	63.0 J		2930	1090 J	0.61	9.50	6.7 D	8600	7490	29.3	22.1	33.0	1.52	1.03	0.00	61.0	30.7	0.032	0.153	0.067
DBMW-10	Shallow	5.3	223	88.7	273	63.6 J	89.6 J		985 J	338 J	0.59	9.80	0.5 D	3300	2800 J	11.1	7.29	11.9	1.63	1.47	0.00	20.5	9.52	0.031	0.158	5.0E-03
DBMW-11	Shallow	7.4	699	519	839	279	64.4 J		3040 J	1870	U	19.8	14 B D	5400	10400 J	34.9	42.7	36.5	7.14	1.06	0.00	63.3	52.7	0.0	0.320	0.14
DBMW-12	Shallow	6.1	573	581	668	315	67.6 J		3350 J	1320	0.36 B	18.1	12 D	6600	8070 J	28.6	47.8	29.1	8.06	1.11	0.00	69.7	37.2	0.019	0.292	0.12
DBMW-12(FD)	Shallow	6.2	562	504	578	264	67.6 J		3240 J	1270	0.34 B	17.3	12 D	5800	8080 J	28.0	41.4	25.1	6.75	1.11	0.00	67.5	35.8	0.018	0.279	0.12
DBMW-13	Shallow	5.4	596	260	696	144 J	48.0 J		2700 J	901 J	U	16.9	9.7 D	7400	6660 J	29.7	21.4	30.3	3.68	0.787	0.00	56.2	25.4	0.0	0.273	0.097
DBMW-14	Shallow	5.5	626	228	644	142 J	58.0 J		2490 J	912 J	0.04 B	16.6	14 D	7100	6540 J	31.2	18.8	28.0	3.63	0.951	0.00	51.8	25.7	2.1E-03	0.268	0.14
DBMW-15	Shallow	7.5	559	204	501	108	53.6 J		2550	375	0.3	8.40	1.3 B D	3700	5020 J	27.9	16.8	21.8	2.76	0.878	0.00	53.1	10.6	0.016	0.136	0.013
DBMW-16	Shallow	5.6	79.6	31.1	170	19.7	74.0 J		565 J	148 J	0.73	2.10	0.015 B D	1070	1020 J	3.97	2.56	7.39	0.504	1.21	0.00	11.8	4.17	0.038	0.0339	1.5E-04
DBMW-17	Shallow	6.4	267	65.6	261	27.3	496 J		1130 J	43.6 J	0.56	1.90	0.012 B D	700	1100 J	13.3	5.39	11.4	0.698	8.13	0.00	23.5	1.23	0.029	0.0307	1.2E-04
DBMW-19	Shallow	5.5	593	307	705	95.1	166 J		2660 J	1100	0.62 B	19.4	5.8 D	4300	7010 J	29.6	25.2	30.7	2.43	2.72	0.00	55.4	31.0	0.033	0.313	0.058
DBMW-2	Shallow	7.5	548	302 J	981 J	71.1 J	68.2 J		3240	1240	0.54	7.00	7.5 D	6400	7590	27.3	24.8	42.7	1.82	1.12	0.00	67.5	34.9	0.028	0.113	0.075
DBMW-20	Shallow	6.9	580	244	585	120	122 J		2120	961	0.22	17.4	3.2 B D	4100	6060 J	28.9	20.1	25.4	3.07	2.00	0.00	44.1	27.1	0.012	0.281	0.032
DBMW-22	Shallow	6.9	484 L	171	283	148	34.0 J		2400 J	271	0.33	1.10	0.13 D	5000	4010 J	24.2	14.1	12.3	3.79	0.557	0.00	50.0	7.63	0.017	0.0178	1.3E-03
DBMW-22(FD)	Shallow	6.8	478 L	170	286	147	33.2 J		2390 J	269	0.25	1.10	0.13 D	5100	3990 J	23.9	14.0	12.4	3.76	0.544	0.00	49.8	7.58	0.013	0.0178	1.3E-03
DBMW-3	Shallow	7.6	562	367 J	970 J	104 J	56.4 J		3230	1410	0.24	15.4	7.6 D	6600	8350	28.0	30.2	42.2	2.66	0.924	0.00	67.2	39.7	0.013	0.249	0.076
DBMW-4	Shallow	7.5	631	237	681	84.8	90.8 J		2610	952	0.092 B	27.7	4.1 D	4400	6590 J	31.5	19.5	29.6	2.17	1.49	0.00	54.3	26.8	4.8E-03	0.447	0.041
DBMW-5	Shallow	6.7	685	234	508	61.6	78.8		2310	959	0.12	26.1	2.8	6600	6140	34.2	19.2	22.1	1.58	1.29	0.00	48.1	27.0	6.3E-03	0.422	0.028
DBMW-7	Shallow	5.3	658	289	617	71.8	65.2 J		2410	1430	U	42.7	3.1 D	6900	7510 J	32.8	23.8	26.8	1.84	1.07	0.00	50.2	40.3	0.0	0.690	0.031
DBMW-7 (FD)	Shallow	5.4	698	301	662	81.1	131 J		2420	1440	U	40.8	3.3 D	8100	7520 J	34.8	24.8	28.8	2.07	2.15	0.00	50.4	40.6	0.0	0.659	0.033
DBMW-8	Shallow	6.0	794	320	668	88.7	56.0		2190	1720	U	46.0	3.6	8000	7940	39.6	26.3	29.1	2.27	0.918	0.00	45.6	48.5	0.0	0.743	0.036
DBMW-9	Shallow	7.4	560	138	307	63.6	78.8 J		2010 J	398 J	0.58	16.6	1.3 D	6700	4360 J	27.9	11.3	13.4	1.63	1.29	0.00	41.8	11.2	0.031	0.268	0.013
DM-1	Shallow	5.8	570	168	570	13.8	273 J		2310 J	346	0.77	19.1	0.27 B D	2400	5020 J	28.4	13.8	24.8	0.353	4.47	0.00	48.1	9.75	0.041	0.309	2.7E-03
HMW-08	Shallow	6.0	781	194	509	74.9	400		1960	701	0.43	10.0	2.2	5900	5550	39.0	16.0	22.1	1.92	6.56	0.00	40.8	19.7	0.023	0.162	0.022
HMW-09	Shallow	8.2	639 L	247	872	80.5	132 J		2720 J	1280	0.68 B	18.3	4.1 D	7800	5100 J	31.9	20.3	37.9	2.06	2.16	0.00	56.6	36.1	0.036	0.296	0.041
HMWWT-6	Shallow	7.7	134	75.3 J	180 J	6.6 J	79.6 J		435	375	0.66	15.3	0.069 D	1600	2240	6.69	6.19	7.83	0.169	1.30	0.00	9.06	10.6	0.035	0.247	6.9E-04
MCF-01A	Deep	6.9	490	146 J	417 J	23.9	35.0		2530	121	0.24	U	0.00017 J	3900	4240	24.5	12.0	18.1	0.611	0.574	0.00	52.7	3.41	0.013	0.00	1.7E-06
MCF-01B	Shallow	7.2	111	63.9	391	10.7	127		889	271	0.65	1.90	0.7 D	1990	2740	5.54	5.25	17.0	0.274	2.08	0.00	18.5	7.63	0.034	0.0307	7.0E-03
MCF-02A	Deep	7.6	21.2	6.49	166 J	10.1	72.0		183	124	0.81	1.00	0.00051	1100	974	1.06	0.534	7.22	0.258	1.18	0.00	3.81	3.49	0.043	0.0162	5.1E-06
MCF-02B	Middle	7.6	23.9	9.01	194 J	9.49	98.0		263	97.5	1.3	1.40	0.00013 J	2200	1090	1.19	0.741	8.44	0.243	1.61	0.00	5.48	2.75	0.068	0.0226	1.3E-06
MCF-03A	Deep	7.8	26.8	11.1	188 L	13	67.0		225	141 J	0.85	2.20	0.0011 B D	700	1170	1.34	0.913	8.18	0.332	1.10	0.00	4.68	3.97	0.045	0.0355	1.1E-05
MCF-03B	Shallow	7.8	150	88.2	532	12.9	130		1220	314	0.79	11.4	0.084 B D	1900	3360	7.49	7.25	23.1	0.330	2.13	0.00	25.4	8.85	0.042	0.184	8.4E-04
MCF-04	Deep	7.3	496	131	719	90.9	41.0		2830 J	416	0.44	U	U	64700	5570	24.8	10.8	31.3	2.32	0.672	0.00	58.9	11.7	0.023	0.00	0.0
MCF-05	Middle	7.7	470	15300	19500	13300	127		80900 J	30900	U	U	U	180000	105000	23.5	1.26E+03	848	340	2.08	0.00	1.68E+03	870	0.0	0.00	0.0
MCF-06A-R	Deep	6.6	250	15800	37800 J	10800	90.4 J		70700	62000	U	U	U	178000	137000 J	12.5	1.30E+03	1.64E+03	276	1.48	0.00	1.47E+03	1.75E+03	0.0	0.00	0.0
MCF-06B	Shallow	8.2	475	3760	4120	3860	94.0		19600 J	8030	U	3.90	4.3 D	11500	39600	23.7	309	179	98.7	1.54	0.00	408	226	0.0	0.0630	0.043
MCF-06C	Shallow	7.3	663	357	688 J	217	66.0 J		2500	1720	U	47.0	4.1 B D	6200	8740 J	33.1	29.4	29.9	5.55	1.08	0.00	52.1	48.5	0.0	0.759	0.041
MCF-07	Deep	7.0	434	15200	29500 J	11900	137 J		83300	41500	U	U	0.093 D	166000	127000 J	21.7	1.25E+03	1.28E+03	304	2.25	0.00	1.73E+03	1.17E+03	0.0	0.00	9.3E-04
MCF-08A	Deep	7.3	608	5650	26200	3010	98.4 J		26200	51200 J	U	U	U	99800	116000	30.3	465	1.14E+03	77.0	1.61	0.00	545	1.44E+03	0.0	0.00	0.0

Summary of Cation-Anion Balance and Related Calculations
2009 Groundwater Sampling Event - BMI Common Areas - Eastside

Well	Zone	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations									
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)
																(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)
MCF-08B-R	Middle	7.2	509	1890	5790 J	837	70.0		11400	7830	U	U	0.00013 J	24800	31400	25.4	155	252	21.4	1.15	0.00	237	221	0.0	0.00	1.3E-06
MCF-08B-R (FD)	Middle	7.4	507	1800	5570 J	793	76.0		10900	7660	U	0.0980 B	0.00024 J	30700	32900	25.3	148	242	20.3	1.25	0.00	227	216	0.0	1.58E-03	2.4E-06
MCF-09A	Deep	7.4	488	1880	5180	650	81.0		15900	5110	U	U	U	22100	27100	24.4	155	225	16.6	1.33	0.00	331	144	0.0	0.00	0.0
MCF-09B	Middle	7.3	445	123	401	45	71.0		2150	149	0.72	0.0230	U	3000	3910	22.2	10.1	17.4	1.15	1.16	0.00	44.8	4.20	0.038	3.72E-04	0.0
MCF-09B(FD)	Middle	7.3	431	118	389	42.8	70.0		2120	146	0.79	U	U	2200	3920	21.5	9.70	16.9	1.09	1.15	0.00	44.1	4.11	0.042	0.00	0.0
MCF-10A	Deep	7.8	528	235	1320	176	36.0 J		3920	1620 J	0.2	U	0.000031 J	4200	9430	26.3	19.3	57.4	4.50	0.590	0.00	81.6	45.6	0.011	0.00	3.1E-07
MCF-10B	Middle	7.5	253	102	237	38.9	51.0		1140	205	0.39	0.0930	0.00032 J	2200	2700	12.6	8.39	10.3	0.995	0.836	0.00	23.7	5.77	0.021	1.50E-03	3.2E-06
MCF-11	Middle	7.4	425	129	459	63.5	100		1960	348	1.2	U	0.1 U	2700	4190	21.2	10.6	20.0	1.62	1.64	0.00	40.8	9.80	0.063	0.00	1.0E-03
MCF-12A	Deep	7.4	518	204	1040	398	77.0		3440	931	0.32	U	0.000049 J	7300	7820	25.8	16.8	45.2	10.2	1.26	0.00	71.6	26.2	0.017	0.00	4.9E-07
MCF-12B	Shallow	7.4	302	136	326 J	82	58.0		1560	317	0.52	6.60	4 D	2900	3640	15.1	11.2	14.2	2.10	0.951	0.00	32.5	8.93	0.027	0.107	0.040
MCF-12C	Middle	7.2	209	82.5	207 J	73.9	72.0		1230	115	0.47	1.50	0.43 D	1000	2520	10.4	6.78	9.00	1.89	1.18	0.00	25.6	3.24	0.025	0.0242	4.3E-03
MCF-16A	Deep	7.5	514	8640	4310	16500	122		53300	3440	UJ	UJ	UJ	78800	63500	25.6	711	187	422	2.00	0.00	1.11E+03	96.9	0.0	0.00	0.0
MCF-16B	Middle	7.8	543	6020	3360	16300	146 J		42800	2450	U	U	0.0055 J B D	64300	55700 J	27.1	495	146	417	2.39	0.00	891	69.0	0.0	0.00	5.5E-05
MCF-16C	Shallow	7.4	601	600	602	308	83.6 J		6290	1050	0.43 B	16.6	8.7 B D	11500	11200 J	30.0	49.3	26.2	7.88	1.37	0.00	131	29.6	0.023	0.268	0.087
MCF-17A	Deep	7.1	666	2930	18200	2020	43.6		14400	28200	U	U	U	76000	78200	33.2	241	792	51.7	0.715	0.00	300	794	0.0	0.00	0.0
MCF-18A	Deep	6.4	2670	2680	58900 J	7090	28.0 J		3590	114000	U	U	0.0061 J D	163000	196000 J	133	220	2.56E+03	181	0.459	0.00	74.7	3.21E+03	0.0	0.00	6.1E-05
MCF-18A (FD)	Deep	6.1	2660	2760	60000 J	7310	27.6 J		3500	112000	U	U	0.0092 J D	173000	195000 J	133	227	2.61E+03	187	0.452	0.00	72.9	3.15E+03	0.0	0.00	9.2E-05
MCF-19A	Deep	7.6	417	9270 J	20600 J	4920 J	116 J		56400	31900	U	U	U	115000	100000	20.8	762	896	126	1.90	0.00	1.17E+03	899	0.0	0.00	0.0
MCF-19A FD	Deep	7.6	467	10300 J	23600 J	5410 J	116 J		58200	33000	U	U	U	119000	101000	23.3	847	1.03E+03	138	1.90	0.00	1.21E+03	930	0.0	0.00	0.0
MCF-20A	Deep	6.8	392	12200 J	29500 J	9470 J	90.0 J		70100	61300	U	U	U	174000	3840	19.6	1.00E+03	1.28E+03	242	1.47	0.00	1.46E+03	1.73E+03	0.0	0.00	0.0
MCF-21A	Deep	7.2	574	12700	14900	12900	135		68600	16300	U	U	U	119000	86900	28.6	1.04E+03	648	330	2.21	0.00	1.43E+03	459	0.0	0.00	0.0
MCF-22A	Deep	6.8	521 J	109 J	268 J	119 J	79.2 J		2450 J	134	0.68	U	U	4400	3800 J	26.0	8.96	11.7	3.04	1.30	0.00	51.0	3.77	0.036	0.00	0.0
MCF-23A	Deep	6.0	512 J	7400	14700 J	3620	82.4 J		37700 J	15800	U	U	U	77300	68500 J	25.5	609	639	92.6	1.35	0.00	785	445	0.0	0.00	0.0
MCF-24A	Deep	6.2	512	12200	7950	15300	141		75100 J	10600	U	U	U	5300	77400	25.5	1.00E+03	346	391	2.31	0.00	1.56E+03	299	0.0	0.00	0.0
MCF-24B	Middle	6.3	324 J	2520	1470 J	4750	134 J		17400 J	1460	U	0.590	0.0045 J D	27500	25500 J	16.2	207	63.9	121	2.20	0.00	362	41.1	0.0	9.53E-03	4.5E-05
MCF-25A	Deep	6.3	470	157	1060	162	75.0		3660 J	601	0.25	U	U	148000	9220	23.5	12.9	46.1	4.14	1.23	0.00	76.2	16.9	0.013	0.00	0.0
MCF-27	Deep	7.8	69.2	21.7	235	13.3	68.0 J		477	89.8	0.75	0.950	0.00079	600	1530 J	3.45	1.78	10.2	0.340	1.11	0.00	9.93	2.53	0.039	0.0153	7.9E-06
MCF-28A	Deep	8.6	1590	3850	40600	6740	64.0	33	6880	105000	UJ	UJ	0.017	188000	191000	79.3	317	1.77E+03	172	1.05	1.09	143	2.96E+03	0.0	0.00	1.7E-04
MCF-28B	Middle	7.4	565	3850	9880	2190	80.4 J		22900 J	14800	U	U	U	45300	54900 J	28.2	317	430	56.0	1.32	0.00	477	417	0.0	0.00	0.0
MCF-29A	Deep	7.9	542	7850	34100	9800	83.2		39200	61600	U	U	U	161000	139000	27.0	646	1.48E+03	251	1.36	0.00	816	1.74E+03	0.0	0.00	0.0
MCF-29B	Middle	7.5	538 J	9910 J	24800 J	11500 J	116 J		53200 J	35100	U	U	U	119000	107000 J	26.8	815	1.08E+03	294	1.90	0.00	1.11E+03	989	0.0	0.00	0.0
MCF-30A	Deep	8.6	571 J	8700	41200 J	8690	147 J	102 J	27400 J	99600	U	U	U	175000	180000 J	28.5	715	1.79E+03	222	2.41	3.40	570	2.81E+03	0.0	0.00	0.0
MCF-30B	Middle	8.8	470 J	11700	31100 J	9990	186 J	120 J	66700 J	58700	U	U	U	168000	137000 J	23.5	962	1.35E+03	255	3.05	4.00	1.39E+03	1.65E+03	0.0	0.00	0.0
MCF-31A	Deep	7.0	442	14000	43500	7770	119		55200	85700	1.0	0.500	0.0057 J	185000	158000	22.1	1.15E+03	1.89E+03	199	1.95	0.00	1.15E+03	2.41E+03	0.053	8.08E-03	5.7E-05
MCF-31B	Middle	7.4	615 J	7160 J	24300 J	4230 J	126 J		31100 J	38400	U	U	U	89700	98400 J	30.7	589	1.06E+03	108	2.06	0.00	648	1.08E+03	0.0	0.00	0.0
MCF-32B	Middle	6.0	518	164	494	142	62.8 J		3190 J	342 J	0.23	9.20E-03 B	0.019 B D	2900	3210 J	25.8	13.5	21.5	3.63	1.03	0.00	66.4	9.63	0.012	1.49E-04	1.9E-04
MW-13	Shallow	7.0	526	207	531 J	117	128 J		2070	908 J	0.51	21.0	2.1 D	3700	5840 J	26.2	17.0	23.1	2.99	2.10	0.00	43.1	25.6	0.027	0.339	0.021
MW-15	Shallow	7.3	409	184	710 J	74.3	151 J		2450	472 J	2.5	0.0260	0.000084 J	4300	5170 J	20.4	15.1	30.9	1.90	2.47	0.00	51.0	13.3	0.13	4.20E-04	8.4E-07
MW-3	Shallow	7.4	443	202	769 J	76.3	89.0 J		1990	1200	1.1	U	0.1 B D	3100	6840 J	22.1	16.6	33.4	1.95	1.46	0.00	41.4	33.8	0.058	0.00	1.0E-03
MW-4	Shallow	7.4	518	974	2140	808	69.0 J		6880	4910	0.36 B	13.8	9.4 D	14400	17200 J	25.8	80.1	93.1	20.7	1.13	0.00	143	138	0.019	0.223	0.094
PC-108	Shallow	6.2	263	95.6	641	19.7	420 J		780	827	1.1	U	0.00064	1700	4430 J	13.1	7.86	27.9	0.504	6.88	0.00	16.2	23.3	0.058	0.00	6.4E-06
PC-2	Shallow	7.4	453	305	989 J	60.6	87.0		2960	1130	0.59	11.4	4.8 D	6000	7460	22.6	25.1	43.0	1.55	1.43	0.00	61.6	31.8	0.031	0.184	0.048
PC-24	Shallow	7.1	835	379	1750 J	24.1	83.0		2100	3630 J	0.8 B	39.2	19 D	9800	13400	41.7	31.2	76.1	0.616	1.36	0.00	43.7	102	0.042	0.633	0.19
PC-28	Shallow	7.4	628	231	1130 J	10.6	93.0		2870	1200 J	0.77 B	41.9	500 D	6600	8440	31.3	19.0	49.2	0.271	1.52	0.00	59.8	33.8	0.041	0.677	5.0
PC-4	Shallow	7.0	574	341	1160 J	129	95.0		3110	1630	0.42	25.8	7.5 D	7400	9140	28.6	28.0	50.5	3.30	1.56	0.00	64.8	45.9	0.022	0.417	0.075
PC-67	Shallow	5.6	709	349	2940 J	25.2	144 J		3120	4300	1.4	48.0	53 B D	11000	18400 J	35.4	28.7	128	0.645	2.36	0.00	65.0	121	0.074	0.775	0.53
PC-76	Shallow	7.4	418	232	649 J	37.1	187 J		2010	908	0.93	2.70	0.84 D	4400	5820 J	20.9	19.1	28.2	0.949	3.06	0.00	41.8	25.6	0.049	0.0436	8.4E-03
PC-79	Shallow	7.3	282	112	558	22.5	202		1110	687	1.1	0.640	3 D	4400	4330	14.1	9.21	24.3	0.575	3.31	0.00	23.1	19.4	0.058	0.0103	0.030
PC-80	Shallow	7.3	191	48.9	480	20.3	284		614	494	1.7	0.0120	0.038 D	2500	3210	9.53	4.02	20.9	0.519	4.65	0.00	12.8	13.9	0.089	1.94E-04	3.8E-04
PC-81	Shallow	7.3	121	54.9	725	27.4	324 J		971	703	3.7	0.0190 B	0.02 U	1300	3960	6.04	4.51	31.5	0.701	5.31	0.00	20.2	19.8	0.19	3.07E-04	2.0E-04
PC-88	Shallow	7.1	263	109	1150	30.1	271 J		1320	1460	1.5	6.10	7.5 D	5700	6320	13.1	8.96	50.0	0.770	4.44	0.00	27.5	41.1	0.079	0.0985	0.075
PC-94	Shallow	7.1	628	259	780 J	61.5	116 J		2700	1190	0.66	19.3	5.7 B D	3100	7790 J	31.3	21.3	33.9	1.57	1.90	0.00	56.2	33.5	0.035	0.312	0.057
POD2-R	Shallow	7.4	685	235	1080	27.7	103 J		2560	1570	0.92	20.7	7.9 D	5500	8870 J	34.2	19.3	47.0	0.708	1.69	0.00	53.3	44.2	0.048	0.334	0.079
POD-8	Shallow	6.9	370	225 J	539 J	32.5 J	197 J		1900	753	0.72	25.4	0.31 D	900	5270	18.5	18.5	23.4	0.831	3.23	0.00	39.6	21.2	0.038	0.410	3.1E-03
POU-3	Shallow	7.4	806	378	1740	33.7	64.8 J		2460	2530	U	12.2	27 D	7600	11200 J	40.2	31.1	75.7	0.862	1.06	0.00	51.2	71.3	0.0	0.197	0.27
WMW5.58SD	Shallow	7.5	473	11600	21300 J	14800	304 J		67700	28000	U	U	0.083 B D	142000	112000 J	23.6	954	926	379	4.98	0.00	1.41E+03	789	0.0	0.00	8.3E-04
WMW5.58SD (FD)	Shallow	7.5	424	9080	17000 J	11700	305 J		67600	28400	U	U	0.067 B D	138000	114000 J	21.2	747	739	299	5.00	0.00	1.41E+03	800	0.0	0.00	6.7E-04
WMW5.58SI	Shallow	7.5	146	59.4 J	369 J	28.9 J	176 J		600	379	1.1	10.6	0.37 D	1100	133000	7.29	4.88	16.1	0.739	2.88	0.00	12.5	10.7	0.058	0.171	3.7E-03
WMW5.58SS	Shallow	7.5	117	52.3 J	252 J	28 J	153 J		503	307	0.86	13.9	0.012 D	1000	2220	5.84	4.30	11.0	0.716	2.51	0.00	10.5	8.65	0.045	0.225	1.2E-04

Well	Cation-Anion Balance Tests					TDS Checks			Lab TDS and EC		Qualifier
	Sum Cations	Sum Anions	(Cat-An)/ (Cat+An)	Acceptable Variance <5% (3)		TDS Sum	Lab/Sum Ratio	Acceptable Ratio 1.0 - 1.2	Lab TDS / EC Ratio	Acceptable Range 0.55 - 0.70	
	(meq/l)	(meq/l)	(%)			(mg/l)	-		-		
AA-01	51	56	4.6	PASS		3413	1.1	PASS	0.83	FAIL	J-TDS
AA-07	31	29	4.1	PASS		1899	1.3	FAIL	0.89	FAIL	J-TDS
AA-08	69	68	0.7	PASS		4256	0.82	FAIL	0.60	PASS	J-TDS
AA-09	92	92	0.0	PASS		5808	1.1	PASS	0.89	FAIL	J-TDS
AA-10	65	69	3.0	PASS		4205	0.98	FAIL	0.70	PASS	J-TDS
AA-13	42	48	6.3	FAIL		2967	0.61	FAIL	0.50	FAIL	R-CAB&TDS
AA-18	17	16	4.3	PASS		1018	0.34	FAIL	0.20	FAIL	J-TDS
AA-20	87	85	1.0	PASS		5440	1.2	PASS	0.84	FAIL	J-TDS
AA-21	84	90	3.5	PASS		5531	1.0	PASS	0.79	FAIL	J-TDS
AA-22	62	60	1.6	PASS		3861	0.93	FAIL	0.75	FAIL	J-TDS
AA-23R	64	67	2.4	PASS		4156	0.58	FAIL	0.40	FAIL	J-TDS
AA-26	37	34	3.3	PASS		2253	0.27	FAIL	0.18	FAIL	J-TDS
AA-27	65	63	1.8	PASS		4081	0.81	FAIL	0.66	PASS	J-TDS
AA-30	97	103	3.2	PASS		6248	0.80	FAIL	0.58	PASS	J-TDS
AA-UW-1	61	58	2.1	PASS		3747	0.83	FAIL	0.66	PASS	J-TDS
AA-UW-2	55	58	2.5	PASS		3603	1.2	PASS	0.89	FAIL	J-TDS
AA-UW-3	78	77	0.5	PASS		5160	0.68	FAIL	0.35	FAIL	J-TDS
AA-UW-4	76	71	3.7	PASS		4814	0.89	FAIL	0.75	FAIL	J-TDS
AA-UW-4(FD)	76	71	3.0	PASS		4815	0.77	FAIL	0.65	PASS	J-TDS
AA-UW-5	14	11	9.5	FAIL		729	0.96	FAIL	0.50	FAIL	R-CAB&TDS
AA-UW-5(FD)	14	12	9.5	FAIL		746	0.80	FAIL	0.43	FAIL	R-CAB&TDS
AA-UW-6	48	54	5.4	FAIL		3429	1.1	PASS	0.86	FAIL	R-CAB&TDS
BEC-6	82	96	7.6	FAIL		5649	1.3	FAIL	1.2	FAIL	R-CAB&TDS
BEC-9	83	79	2.1	PASS		4894	1.1	PASS	0.80	FAIL	J-TDS
COH-1	1675	1629	1.4	PASS	1	103220	1.1	PASS	0.75	FAIL	J-TDS
COH-2	1499	1432	2.3	PASS	1	89847	1.0	PASS	1.1	FAIL	J-TDS
COH-2A	84	87	1.7	PASS		5322	0.62	FAIL	0.44	FAIL	J-TDS
DBMW-1	86	93	3.9	PASS		5749	1.5	FAIL	1.1	FAIL	J-TDS
DBMW-10	32	32	0.4	PASS		2036	1.6	FAIL	1.2	FAIL	J-TDS
DBMW-11	121	117	1.6	PASS		7318	0.74	FAIL	0.52	FAIL	J-TDS
DBMW-12	113	108	2.3	PASS		6878	0.96	FAIL	0.82	FAIL	J-TDS
DBMW-12(FD)	101	105	1.6	PASS		6488	0.89	FAIL	0.72	FAIL	J-TDS
DBMW-13	85	83	1.4	PASS		5352	1.4	FAIL	1.1	FAIL	J-TDS
DBMW-14	82	79	1.7	PASS		5107	1.4	FAIL	1.1	FAIL	J-TDS
DBMW-15	69	65	3.4	PASS		4339	0.85	FAIL	0.74	FAIL	J-TDS
DBMW-16	14	17	8.8	FAIL		1061	1.0	PASS	1.0	FAIL	R-CAB&TDS
DBMW-17	31	33	3.4	PASS		2095	0.33	FAIL	0.64	PASS	J-TDS
DBMW-19	88	89	0.9	PASS		5586	0.77	FAIL	0.61	PASS	J-TDS
DBMW-2	97	104	3.5	PASS		6438	0.99	FAIL	0.84	FAIL	J-TDS
DBMW-20	78	74	2.6	PASS		4704	0.87	FAIL	0.68	PASS	J-TDS
DBMW-22	54	58	3.5	PASS		3779	1.3	FAIL	1.2	FAIL	J-TDS
DBMW-22(FD)	54	58	3.5	PASS		3761	1.4	FAIL	1.3	FAIL	J-TDS
DBMW-3	103	108	2.4	PASS		6700	0.99	FAIL	0.79	FAIL	J-TDS
DBMW-4	83	83	0.2	PASS		5282	0.83	FAIL	0.67	PASS	J-TDS
DBMW-5	77	77	0.2	PASS		4834	1.4	FAIL	1.1	FAIL	J-TDS
DBMW-7	85	92	3.9	PASS		5561	1.2	FAIL	0.92	FAIL	J-TDS
DBMW-7 (FD)	90	94	1.8	PASS		5725	1.4	FAIL	1.1	FAIL	J-TDS
DBMW-8	97	96	0.8	PASS		5864	1.4	FAIL	1.0	FAIL	J-TDS
DBMW-9	54	55	0.4	PASS		3542	1.9	FAIL	1.5	FAIL	J-TDS
DM-1	67	63	3.6	PASS		4162	0.58	FAIL	0.48	FAIL	J-TDS
HMW-08	79	67	8.0	FAIL		4473	1.3	FAIL	1.1	FAIL	R-CAB&TDS
HMW-09	92	95	1.6	PASS		5941	1.3	FAIL	1.5	FAIL	J-TDS
HMWWT-6	21	21	0.8	PASS		1270	1.3	FAIL	0.71	FAIL	J-TDS
MCF-01A	55	57	1.3	PASS		3749	1.0	PASS	0.92	FAIL	J-TDS
MCF-01B	28	28	0.4	PASS		1816	1.1	PASS	0.73	FAIL	J-TDS
MCF-02A	9	9	3.0	FAIL		556	2.0	FAIL	1.1	FAIL	R-CAB&TDS
MCF-02B	11	10	3.4	FAIL		658	3.3	FAIL	2.0	FAIL	R-CAB&TDS
MCF-03A	11	10	4.5	FAIL		648	1.1	PASS	0.60	PASS	J-CAB
MCF-03B	38	37	2.1	PASS		2407	0.79	FAIL	0.57	PASS	J-TDS
MCF-04	69	71	1.6	PASS		4708	14	FAIL	12	FAIL	J-TDS
MCF-05	2470	2557	1.7	PASS	1	160446	1.1	PASS	1.7	FAIL	J-TDS
MCF-06A-R	3232	3220	0.2	PASS	1	197404	0.90	FAIL	1.3	FAIL	J-TDS
MCF-06B	611	636	2.0	PASS		39910	0.29	FAIL	0.29	FAIL	J-TDS
MCF-06C	98	102	2.2	PASS		6236	0.99	FAIL	0.71	FAIL	J-TDS
MCF-07	2859	2906	0.8	PASS	1	181916	0.91	FAIL	1.3	FAIL	J-TDS
MCF-08A	1712	1989	7.5	FAIL	1	112927	0.88	FAIL	0.86	FAIL	R-CAB&TDS

Well	Cation-Anion Balance Tests					TDS Checks			Lab TDS and EC		Qualifier
	Sum Cations	Sum Anions	(Cat-An)/ (Cat+An)	Acceptable Variance <5% (3)		TDS Sum	Lab/Sum Ratio	Acceptable Ratio 1.0 - 1.2	Lab TDS / EC Ratio	Acceptable Range 0.55 - 0.70	
	(meq/l)	(meq/l)	(%)			(mg/l)	-		-		
MCF-08B-R	454	459	0.5	PASS		28298	0.88	FAIL	0.79	FAIL	J-TDS
MCF-08B-R (FD)	436	444	0.9	PASS		27276	1.1	PASS	0.93	FAIL	J-TDS
MCF-09A	421	476	6.2	FAIL		29257	0.76	FAIL	0.82	FAIL	R-CAB&TDS
MCF-09B	51	50	0.7	PASS		3356	0.89	FAIL	0.77	FAIL	J-TDS
MCF-09B(FD)	49	49	0.2	PASS		3290	0.67	FAIL	0.56	PASS	J-TDS
MCF-10A	108	128	8.6	FAIL		7821	0.54	FAIL	0.45	FAIL	R-CAB&TDS
MCF-10B	32	30	3.1	PASS		2007	1.1	PASS	0.81	FAIL	J-TDS
MCF-11	53	52	1.0	PASS		3446	0.78	FAIL	0.64	PASS	J-TDS
MCF-12A	98	99	0.6	PASS		6578	1.1	PASS	0.93	FAIL	J-TDS
MCF-12B	43	43	0.0	PASS		2769	1.0	PASS	0.80	FAIL	J-TDS
MCF-12C	28	30	3.4	PASS		1963	0.51	FAIL	0.40	FAIL	J-TDS
MCF-16A	1346	1209	5.4	FAIL	1	86777	0.91	FAIL	1.2	FAIL	R-CAB&TDS
MCF-16B	1085	963	6.0	FAIL	1	71561	0.90	FAIL	1.2	FAIL	R-CAB&TDS
MCF-16C	113	162	17.7	FAIL		9527	1.2	FAIL	1.0	FAIL	R-CAB&TDS
MCF-17A	1117	1095	1.0	PASS	1	66442	1.1	PASS	0.97	FAIL	J-TDS
MCF-18A	3097	3286	3.0	PASS	1	188947	0.86	FAIL	0.83	FAIL	J-TDS
MCF-18A (FD)	3156	3228	1.1	PASS	1	188247	0.92	FAIL	0.89	FAIL	J-TDS
MCF-19A	1805	2075	7.0	FAIL	1	123577	0.93	FAIL	1.2	FAIL	R-CAB&TDS
MCF-19A FD	2035	2143	2.6	PASS	1	131047	0.91	FAIL	1.2	FAIL	J-TDS
MCF-20A	2548	3188	11.1	FAIL	1	183016	0.95	FAIL	45	FAIL	R-CAB&TDS
MCF-21A	2051	1890	4.1	PASS	1	126055	0.94	FAIL	1.4	FAIL	J-TDS
MCF-22A	50	56	6.1	FAIL		3649	1.2	FAIL	1.2	FAIL	R-CAB&TDS
MCF-23A	1366	1231	5.2	FAIL	1	79781	0.97	FAIL	1.1	FAIL	R-CAB&TDS
MCF-24A	1766	1865	2.7	PASS	1	121747	0.044	FAIL	0.068	FAIL	J-TDS
MCF-24B	409	406	0.4	PASS		28005	0.98	FAIL	1.1	FAIL	J-TDS
MCF-25A	87	94	4.3	PASS		6155	24	FAIL	16	FAIL	J-TDS
MCF-27	16	14	7.4	FAIL		949	0.63	FAIL	0.39	FAIL	R-CAB&TDS
MCF-28A	2334	3103	14.1	FAIL	1	164718	1.1	PASS	0.98	FAIL	R-CAB&TDS
MCF-28B	831	895	3.7	PASS	1	54233	0.84	FAIL	0.83	FAIL	J-TDS
MCF-29A	2406	2553	2.9	PASS	1	153142	1.1	PASS	1.2	FAIL	J-TDS
MCF-29B	2215	2098	2.7	PASS	1	135118	0.88	FAIL	1.1	FAIL	J-TDS
MCF-30A	2758	3382	10.2	FAIL	1	186310	0.94	FAIL	0.97	FAIL	R-CAB&TDS
MCF-30B	2594	3049	8.1	FAIL	1	178844	0.94	FAIL	1.2	FAIL	R-CAB&TDS
MCF-31A	3264	3565	4.4	PASS	1	206685	0.90	FAIL	1.2	FAIL	J-TDS
MCF-31B	1785	1731	1.5	PASS	1	105881	0.85	FAIL	0.91	FAIL	J-TDS
MCF-32B	64	77	8.9	FAIL		4888	0.59	FAIL	0.90	FAIL	R-CAB&TDS
MW-13	69	71	1.3	PASS		4459	0.83	FAIL	0.63	PASS	J-TDS
MW-15	68	67	1.0	PASS		4392	0.98	FAIL	0.83	FAIL	J-TDS
MW-3	74	77	1.7	PASS		4735	0.65	FAIL	0.45	FAIL	J-TDS
MW-4	220	283	12.6	FAIL		16295	0.88	FAIL	0.84	FAIL	R-CAB&TDS
PC-108	49	46	3.0	PASS		2879	0.59	FAIL	0.38	FAIL	J-TDS
PC-2	92	95	1.5	PASS		5967	1.0	PASS	0.80	FAIL	J-TDS
PC-24	150	148	0.5	PASS		8827	1.1	PASS	0.73	FAIL	J-TDS
PC-28	100	101	0.5	PASS		6668	0.99	FAIL	0.78	FAIL	J-TDS
PC-4	110	113	1.0	PASS		7035	1.1	PASS	0.81	FAIL	J-TDS
PC-67	193	190	0.7	PASS		11632	0.95	FAIL	0.60	PASS	J-TDS
PC-76	69	71	1.1	PASS		4371	1.0	PASS	0.76	FAIL	J-TDS
PC-79	48	46	2.4	PASS		2897	1.5	FAIL	1.0	FAIL	J-TDS
PC-80	35	31	5.3	FAIL		2020	1.2	FAIL	0.78	FAIL	R-CAB&TDS
PC-81	43	46	3.1	PASS		2800	0.46	FAIL	0.33	FAIL	J-TDS
PC-88	73	73	0.3	PASS		4510	1.3	FAIL	0.90	FAIL	J-TDS
PC-94	88	92	2.2	PASS		5714	0.54	FAIL	0.40	FAIL	J-TDS
POD2-R	101	100	0.8	PASS		6249	0.88	FAIL	0.62	PASS	J-TDS
POD-8	61	64	2.6	PASS		3964	0.23	FAIL	0.17	FAIL	J-TDS
POU-3	148	124	8.8	FAIL		8026	0.95	FAIL	0.68	PASS	R-CAB&TDS
WMW5.58SD	2283	2203	1.8	PASS	1	144055	0.99	FAIL	1.3	FAIL	J-TDS
WMW5.58SD (FD)	1807	2212	10.1	FAIL	1	134387	1.0	PASS	1.2	FAIL	R-CAB&TDS
WMW5.58SI	29	26	4.8	PASS		1700	0.65	FAIL	8.3E-03	FAIL	J-TDS
WMW5.58SS	22	22	0.2	PASS		1366	0.73	FAIL	0.45	FAIL	J-TDS

Total Samples:	125		125		125	
Passing:	96		26		18	
Failing:	29		99		107	
% Usable						75.86

Summary of Cation-Anion Balance and Related Calculations
2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Large Anion Sum Cation-Anion Balance

Well	pH	Major Ion Chemistry Data Input											TDS and Temperature		Density	molality (mol/kg) Calculations										Cation-Anion Balance Tests			
		Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Temperature Measured	TDS Measured	Density Calculated	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cation (molality * valence)	Sum Anions (molality * valence)	Charge Balance Error	Acceptable Variance <5%?
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	°C	(mg/L)	(kg/L)	40.078 (g/mol) (mol/kg)	24.305 (g/mol) (mol/kg)	22.9898 (g/mol) (mol/kg)	39.0983 (g/mol) (mol/kg)	61.0168 (g/mol) (mol/kg)	60.089 (g/mol) (mol/kg)	96.0626 (g/mol) (mol/kg)	35.453 (g/mol) (mol/kg)	18.998 (g/mol) (mol/kg)	62.0049 (g/mol) (mol/kg)	99.4506 (g/mol) (mol/kg)	(meq/kg)	(meq/kg)	(%)	
COH-1	8.2	490 L	8190	18700	6380	100 J		44600 J	24800	U	U	U	23.0	117000	1.088	0.0112	0.310	0.748	0.150	1.51E-03	0.00	0.427	0.643	0.00	0.00	0.0	1.54	1.50	1.4	PASS
COH-2	7.5	560	7400	17000 L	4830	95		35400	24600 J	U	U	U	26.6	89900	1.065	0.0131	0.286	0.694	0.116	1.46E-03	0.00	0.346	0.651	0.0	0.00	0.0	1.41	1.34	2.3	PASS
MCF-05	7.7	470	15300	19500	13300	127		80900 J	30900	U	U	U	28.53	180000	1.138	0.0103	0.553	0.746	0.299	1.83E-03	0.00	0.740	0.766	0.0	0.00	0.0	2.17	2.25	1.7	PASS
MCF-06A-R	6.6	250	15800	37800 J	10800	90.4 J		70700	62000	U	U	U	(2)	178000	1.138	5.48E-03	0.571	1.44	0.243	1.30E-03	0.00	0.646	1.54	0.0	0.00	0.0	2.84	2.83	0.17	PASS
MCF-07	7.0	434	15200	29500 J	11900	137 J		83300	41500	U	U	0.093 D	25.4	166000	1.127	9.61E-03	0.555	1.14	0.270	1.99E-03	0.00	0.769	1.04	0.0	0.00	8.3E-07	2.54	2.58	0.82	PASS
MCF-08A	7.3	608	5650	26200	3010	98.4 J		26200	51200 J	U	U	U	29.2	99800	1.072	0.0142	0.217	1.06	0.0718	1.50E-03	0.00	0.254	1.35	0.0	0.00	0.0	1.60	1.86	7.5	FAIL
MCF-16A	7.5	514	8640	4310	16500	122		53300	3440	UJ	UJ	UJ	26.5	78800	1.056	0.0121	0.337	0.178	0.400	1.89E-03	0.00	0.525	0.0919	0.0	0.00	0.0	1.27	1.14	5.4	FAIL
MCF-16B	7.8	543	6020	3360	16300	146 J		42800	2450	U	U	0.0055 J B D	29.33	64300	1.044	0.0130	0.237	0.140	0.399	2.29E-03	0.00	0.427	0.0662	0.0	0.00	5.3E-08	1.04	0.92	6.0	FAIL
MCF-17A	7.1	666	2930	18200	2020	43.6		14400	28200		U	U	26.2	76000	1.054	0.0158	0.114	0.751	0.0490	6.78E-04	0.00	0.142	0.755	0.0	0.00	0.0	1.06	1.04	0.98	PASS
MCF-18A	6.4	2670	2680	58900 J	7090	28 J		3590	114000	U	U	0.0061 J D	23.7	163000	1.126	0.0592	0.0980	2.28	0.161	4.08E-04	0.00	0.0332	2.86	0.0	0.00	5.4E-08	2.75	2.92	3.0	PASS
MCF-18A (FD)	6.1	2660	2760	60000 J	7310	27.6 J		3500	112000	U	U	0.0092 J D	23.7	173000	1.134	0.0585	0.100	2.30	0.165	3.99E-04	0.00	0.0321	2.79	0.0	0.00	8.2E-08	2.78	2.85	1.2	PASS
MCF-19A	7.6	417	9270 J	20600 J	4920 J	116 J		56400	31900	U	U	U	28.51	115000	1.084	9.60E-03	0.352	0.827	0.116	1.75E-03	0.00	0.542	0.830	0.0	0.00	0.0	1.67	1.91	7.0	FAIL
MCF-19A FD	7.6	467	10300 J	23600 J	5410 J	116 J		58200	33000	U	U	U	28.51	119000	1.087	0.0107	0.390	0.944	0.127	1.75E-03	0.00	0.557	0.856	0.0	0.00	0.0	1.87	1.97	2.6	PASS
MCF-20A	6.8	392	12200 J	29500 J	9470 J	90 J		70100	61300	U	U	U	(2)	174000	1.135	8.62E-03	0.442	1.13	0.213	1.30E-03	0.00	0.643	1.52	0.0	0.00	0.0	2.25	2.81	11	FAIL
MCF-21A	7.2	574	12700	14900	12900	135		68600	16300	U	U	U	28.33	119000	1.087	0.0132	0.481	0.596	0.303	2.03E-03	0.00	0.657	0.423	0.0	0.00	0.0	1.89	1.74	4.1	PASS
MCF-23A	6.0	512 J	7400	14700 J	3620	82.4 J		37700 J	15800	U	U	U	25.5	77300	1.056	0.0121	0.288	0.606	0.0877	1.28E-03	0.00	0.372	0.422	0.0	0.00	0.0	1.29	1.17	5.2	FAIL
MCF-24A	6.2	512	12200	7950	15300	141		75100 J	10600	U	U	U	28.67	5300	1.000	0.0128	0.502	0.346	0.391	2.31E-03	0.00	0.782	0.299	0.0	0.00	0.0	1.77	1.86	2.7	PASS
MCF-28A	8.6	1590	3850	40600	6740	64	32.8	6880	105000	UJ	UJ	0.017	26.8	188000	1.145	0.0346	0.138	1.54	0.151	9.16E-04	4.77E-04	0.0626	2.59	0.0	0.00	1.5E-07	2.04	2.71	14	FAIL
MCF-28B	7.4	565	3850	9880	2190	80.4 J		22900 J	14800	U	U	U	24.8	45300	1.031	0.0137	0.154	0.417	0.0543	1.28E-03	0.00	0.231	0.405	0.0	0.00	0.0	0.81	0.87	3.8	PASS
MCF-29A	7.9	542	7850	34100	9800	83.2		39200	61600	U		U	26.5	161000	1.123	0.0120	0.288	1.32	0.223	1.21E-03	0.00	0.363	1.55	0.0	0.00	0.0	2.14	2.28	3.0	PASS
MCF-29B	7.5	538 J	9910 J	24800 J	11500 J	116 J		53200 J	35100	U	U	U	26.3	119000	1.090	0.0123	0.374	0.990	0.270	1.74E-03	0.00	0.508	0.909	0.0	0.00	0.0	2.03	1.93	2.7	PASS
MCF-30A	8.6	571 J	8700	41200 J	8690	147 J	102 J	27400 J	99600	U	U	U	26.35	175000	1.134	0.0126	0.316	1.58	0.196	2.12E-03	1.50E-03	0.251	2.48	0.0	0.00	0.0	2.43	2.98	10	FAIL
MCF-30B	8.8	470 J	11700	31100 J	9990	186 J	120 J	66700 J	58700	U	U	U	27.0	168000	1.128	0.0104	0.427	1.20	0.226	2.70E-03	1.77E-03	0.615	1.47	0.0	0.00	0.0	2.30	2.70	8.1	FAIL
MCF-31A	7.0	442	14000	43500	7770	119		55200	85700	1.0	0.500	0.0057 J	27.8	185000	1.142	9.66E-03	0.504	1.66	0.174	1.71E-03	0.00	0.503	2.12	4.6E-05	7.06E-06	5.0E-08	2.86	3.12	4.4	PASS
MCF-31B	7.4	615 J	7160 J	24300 J	4230 J	126 J		31100 J	38400	U	U	U	27.44	89700	1.066	0.0144	0.276	0.991	0.101	1.94E-03	0.00	0.304	1.02	0.0	0.00	0.0	1.67	1.63	1.5	PASS
WMW5.58SD	7.5	473	11600	21300 J	14800	304 J		67700	28000	U	U	0.083 B D	25.7	142000	1.107	0.0107	0.431	0.837	0.342	4.50E-03	0.00	0.637	0.713	0.0	0.00	7.5E-07	2.06	1.99	1.8	PASS
WMW5.58SD (FD)	7.5	424	9080	17000 J	11700	305 J		67600	28400	U	U	0.067 B D	25.7	138000	1.104	9.58E-03	0.338	0.670	0.271	4.53E-03	0.00	0.637	0.726	0.0	0.00	6.1E-07	1.64	2.01	10	FAIL

Total Samples:	27
Passing:	17
Failing:	10

2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Comparison of Filtered and Unfiltered Samples

Well	Filtered	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations										Cation-Anion Balance Tests			
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cations	Sum Anions	(Cat-An)/(Cat+An)	Acceptable Variance <5%? (3)
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50				
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)				
																(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(%)	
AA-01		6.9	471	142	364	7.21	93		1640	719	1.2	11	1.9 D	3800	4560	23.5	11.7	15.8	0.184	1.52	0.00	34.1	20.3	0.063	0.18	0.019	51	56	4.6	PASS-UF
AA-01 (FILTERED)	X		486	148	376	7.38	87		1720	759	1.2	9.9	1.9 D			24.3	12.2	16.4	0.189	1.43	0.00	35.8	21.4	0.063	0.16	0.019	53	59	5.3	FAIL-F
AA-22		7.3	692	133	353	46	68.8		1900	677	0.21	17	1.7	3600	4800	34.5	10.9	15.4	1.18	1.13	0.00	39.6	19.1	0.011	0.27	0.017	62	60	1.6	PASS-UF
AA-22 (FILTERED)	X		674	139	350	54.9	66		1930	630	0.19	15	1.7			33.6	11.4	15.2	1.40	1.08	0.00	40.2	17.7	1.0E-02	0.24	0.017	62	59	2.0	PASS-F
DBMW-5		6.7	685	234	508	61.6	78.8		2310	959	0.12	26	2.8	6600	6140	34.2	19.2	22.1	1.58	1.29	0.00	48.1	27.0	6.3E-03	0.42	0.028	77	77	0.2	PASS-UF
DBMW-5 (FILTERED)	X		666	227	495	68.2	76		2200	919	0.11	25	3			33.2	18.7	21.5	1.74	1.25	0.00	45.8	25.9	5.8E-03	0.41	0.030	75	73	1.2	PASS-F
DBMW-8		6	794	320	668	88.7	56		2190	1720	U	46	3.6	8000	7940	39.6	26.3	29.1	2.27	0.918	0.00	45.6	48.5	0.0	0.74	0.036	97	96	0.8	PASS-UF
DBMW-8 (FILTERED)	X		795	319	671	89.1	54.4		2120	1660	U	45	2.2			39.7	26.2	29.2	2.28	0.892	0.00	44.1	46.8	0.0	0.72	0.022	97	93	2.5	PASS-F
HMW-08		6	781	194	509	74.9	400		1960	701	0.43	10	2.2	5900	5550	39.0	16.0	22.1	1.92	6.56	0.00	40.8	19.7	0.023	0.16	0.022	79	67	8.0	FAIL-UF
HMW-08 (FILTERED)	X		614	173	514	70.1	284		2000	714	0.45	9.9	2.1			30.6	14.2	22.4	1.79	4.65	0.00	41.6	20.1	0.024	0.16	0.021	69	67	1.8	PASS-F
MCF-16A		7.5	514	8640	4310	16500	122		53300	3440	UJ	UJ	UJ	78800	63500	25.6	711	187	422	2.00	0.00	1.11E+03	96.9	0.0	0.0	0.0	1346	1209	5.4	FAIL-UF
MCF-16A (FILTERED)	X		497	8280	4170	15900	118		54200	3470	U	U	U			24.8	681	181	407	1.93	0.00	1.13E+03	97.7	0.0	0.0	0.0	1294	1228	2.6	PASS-F
MCF-17A		7.1	666	2930	18200	2020	43.6		14400	28200	U	U	U	76000	78200	33.2	241	792	51.7	0.715	0.00	300	794	0.0	0.0	0.0	1117	1095	1.0	PASS-UF
MCF-17A (FILTERED)	X		693	3030	18800	2120	44		14400	27600	U	U	U			34.6	249	818	54.2	0.721	0.00	300	777	0.0	0.0	0.0	1156	1078	3.5	PASS-F
MCF-28A		8.6	1590	3850	40600	6740	64	32.8	6880	105000	UJ	UJ	0.017	188000	191000	79.3	317	1.77E+03	172	1.05	1.09	143	2.96E+03	0.0	0.0	1.7E-04	2334	3103	14.1	FAIL-UF
MCF-28A (FILTERED)	X		1460	3770	44400	7840	56	36	6930	106000	U	U	U			72.9	310	1.93E+03	201	0.918	1.20	144	2.99E+03	0.0	0.0	0.0	2515	3132	10.9	FAIL-F
MCF-29A		7.9	542	7850	34100	9800	83.2		39200	61600	U	U	U	161000	139000	27.0	646	1.48E+03	251	1.36	0.00	816	1.74E+03	0.0	0.0	0.0	2406	2553	2.9	PASS-UF
MCF-29A (FILTERED)	X		534	7660	39000	8410	82.4		39400	61800	U	U	UJ			26.6	630	1.70E+03	215	1.35	0.00	820	1.74E+03	0.0	0.0	0.0	2568	2563	0.1	PASS-F
MCF-31A		7	442	14000	43500	7770	119		55200	85700	1	0.50	0.0057 J	185000	158000	22.1	1.15E+03	1.89E+03	199	1.95	0.00	1.15E+03	2.41E+03	0.053	8.1E-03	5.7E-05	3264	3565	4.4	PASS-UF
MCF-31A (FILTERED)	X		453	14100	48400	8230	120		55800	83900	U	U	0.0038 J			22.6	1.16E+03	2.11E+03	210	1.97	0.00	1.16E+03	2.36E+03	0.0	0.0	3.8E-05	3498	3527	0.4	PASS-F
AA-07		7	266	87.8 J	224 J	42.1	84		956	261	0.68	11	0.4 D	2500	2800	13.3	7.22	9.74	1.08	1.38	0.00	19.9	7.35	0.036	0.17	4.0E-03	31	29	4.1	PASS-UF
AA-07(FILTERED)	X		266	86.9 J	226 J	42.3	80		1050	277	0.66	11	0.46 D			13.3	7.15	9.83	1.08	1.31	0.00	21.9	7.80	0.035	0.17	4.6E-03	31	31	0.2	PASS-F
AA-08		7.2	454	208	657	32.9	163		1820	975	1.3	6.2	3.3 B D	3500	5840	22.7	17.1	28.6	0.841	2.67	0.00	37.9	27.5	0.068	0.10	0.033	69	68	0.7	PASS-UF
AA-08 (FILTERED)	X		437	199	633	31.6	155		1840	1000	1.3	6.3	3.2 B D			21.8	16.4	27.5	0.808	2.54	0.00	38.3	28.2	0.068	0.10	0.032	67	69	2.0	PASS-F
AA-09		7.5	538	294	923 J	30.5	69		2870	1090	0.54 B	14	6 D	6600	7390	26.8	24.2	40.1	0.780	1.13	0.00	59.8	30.7	0.028	0.23	0.060	92	92	0.0	PASS-UF
AA-09 (FILTERED)	X		539	280	851 J	25.9	61		2870	1080	0.51 B	14	7.2 B D			26.9	23.0	37.0	0.662	1.000	0.00	59.8	30.4	0.027	0.23	0.072	88	92	2.2	PASS-F
AA-10		7.2	404	200	633 J	36.2	148		1800	1030	1	7.4	4.3 D	4110	5890	20.2	16.4	27.5	0.926	2.43	0.00	37.5	29.0	0.053	0.12	0.043	65	69	3.0	PASS-UF
AA-10(FILTERED)	X		398	196	623 J	35	146		1810	1030	1	7.8	5.1 D			19.9	16.1	27.1	0.895	2.39	0.00	37.7	29.0	0.053	0.13	0.051	64	69	4.0	PASS-F
AA-13		7.1	260	114	439	23.2	199		1590	371 J	0.76	50	0.097 B D	1800	3630	13.0	9.38	19.1	0.593	3.26	0.00	33.1	10.5	0.040	0.80	9.7E-04	42	48	6.3	FAIL-UF
AA-13 (FILTERED)	X		268	120	447 L	27.2	198		1310	299 J	0.8	21	0.092 B D			13.4	9.87	19.4	0.696	3.24	0.00	27.3	8.42	0.042	0.34	9.2E-04	43	39	4.9	PASS-F
AA-18		7.5	110	57.2	156 J	16.8	95		401	208	0.68	11	0.11 D	350 U	1720	5.49	4.70	6.79	0.430	1.56	0.00	8.35	5.86	0.036	0.17	1.1E-03	17	16	4.3	PASS-UF
AA-18(FILTERED)	X		108	56.2	154 J	16.7	95		420	212	0.71	11	0.11 D			5.39	4.62	6.70	0.427	1.56	0.00	8.74	5.97	0.037	0.17	1.1E-03	17	16	1.9	PASS-F
AA-20		6.9	556	235	898 J	44.2	78 J		2540	1100	0.22	15	5.3 D	6400	7640 J	27.7	19.3	39.1	1.13	1.28	0.00	52.9	31.0	0.012	0.24	0.053	87	85	1.0	PASS-UF
AA-20 (FILTER)	X		552	231	879 J	42.7	79 J		2510	1100	0.28	15	5.4 D			27.5	19.0	38.2	1.09	1.29	0.00	52.3	31.0	0.015	0.25	0.054	86	85	0.6	PASS-F
AA-21		7.2	512	299	720 J	83.3	189		2800	994	1.6 B	7.4	0.052 B D	5600	7100	25.5	24.6	31.3	2.13	3.10	0.00	58.3	28.0	0.084	0.12	5.2E-04	84	90	3.5	PASS-UF
AA-21 (FILTERED)	X		520	300	740 J	84.6	180		2770	1000	1.6 B	7.5	0.057 B D			25.9	24.7	32.2	2.16	2.95	0.00	57.7	28.2	0.084	0.12	5.7E-04	85	89	2.3	PASS-F
AA-23R		7.4	635	159	408 J	62.7	90.4 J		1880	928	0.48	27	1.9 B D	2400	6010 J	31.7	13.1	17.7	1.60	1.48	0.00	39.1	26.1	0.025	0.43	0.019	64	67	2.4	PASS-UF
AA-23R (FILTER)	X		656	161	426 J	62.6	89.8 J		1860	948	0.35	29	0.054 B D			32.7	13.2	18.5	1.60	1.47	0.00	38.7	26.7	0.018	0.47	5.4E-04	66	67	1.0	PASS-F
AA-26		7.5	252	90.9	356 J	44.1	70 J		1100	355	0.79	12	0.049 B D	600	3420 J	12.6	7.48	15.5	1.13	1.15	0.00	22.9	10.0	0.042	0.20	4.9E-04	37	34	3.3	PASS-UF
AA-26 (FILTER)	X		247	89.3	351 J	43.3	85.8 J		1140	380	0.79	12	0.048 B D			12.3	7.34	15.3	1.11	1.41	0.00	23.7	10.7	0.042	0.19	4.8E-04	36	36	0.1	PASS-F
AA-27		7.6	513	192	535	8.58	126		2320	422	2	13	0.23 D	3300	4980	25.6	15.8	23.3	0.219	2.06	0.00	48.3	11.9	0.11	0.20	2.3E-03	65	63	1.8	PASS-UF
AA-27(FILTER)	X		516	201	538	8.56	130		2290	417	2	12	0.23 D			25.7	16.5	23.4	0.219	2.13	0.00	47.7	11.7	0.11	0.20	2.3E-03	66	62	3.2	PASS-F
AA-30		7.1	643	347	721 J	180	115 J		2630	1620	0.11	36	2.5 B D	5000	8610 J	32.1	28.5	31.4	4.60	1.88	0.00	54.8	45.6	5.8E-03	0.58	0.025	97	103	3.2	PASS-UF
AA-30 (FILTER)	X		648	342	713 J	177	116 J		2570	1580	0.14	34	2.4 B D			32.3	28.1	31.0	4.53	1.90	0.00	53.5	44.5	7.4E-03	0.55	0.024	96	101	2.3	PASS-F
AA-UW-1		5.8	541	219	353	8.55	90		2150	415 J	1.2	5.0	0.63 D	3100	4680	27.0	18.0	15.4	0.219	1.47	0.00	44.8	11.7	0.063	0.081	6.3E-03	61	58	2.1	PASS-UF
AA-UW-1 (FILTERED)	X		522	227	367	7.87	88		2160	412 J	1.1	5.0	0.74 D			26.0	18.7	16.0	0.201	1.44	0.00	45.0	11.6	0.058	0.081	7.4E-03	61	58	2.3	PASS-F
AA-UW-2		7.3	378	191	461 J	7.88	120		1970	512	0.9	10	0.099 D	4200	4740	18.9	15.7	20.1	0.202	1.97	0.00	41.0	14.4	0.047	0.16	9.9E-04	55	58	2.5	PASS-UF
AA-UW-2(FILTERED)	X		371	188	455 J	7.78	115		1920	500	0.97	10	0.099 D			18.5	15.5	19.8	0.199	1.88	0.00	40.0	14.1	0.051	0.16	9.9E-04	54	56	2.0	PASS-F
AA-UW-3		7.7	338	221	979	16.1	81		3280	267	1	8.9	0.065 D	3500	9870	16.9	18.2	42.6	0.412	1.33	0.00	68.3	7.52	0.053	0.14	6.5E-04	78	77	0.5	PASS-UF
AA-UW-3 (FILTERED)	X		326	228	1010	15.2	85		3130	253	1	8.9	0.068 D			16.3	18.8	43.9	0.389	1.39	0.00	65.2	7.13	0.053	0.14	6.8E-04	79	74	3.6	PASS-F
AA-UW-4		7.6	401	194	919	16	78		2920	304	0.81	13	0.077 D	4300	5700	20.0	16.0	40.0	0.409	1.28	0.00	60.8	8.56	0.043	0.20	7.7E-04	76	71	3.7	PASS-UF
AA-UW-4(FILTER)	X		389	182	891	15.4	80		2970	307	0.86	13	0.081 D			19.4	15.0	38.8	0.394	1.31	0.00	61.8	8.65	0.045	0.20	8.1E-04	74	72	1.0	PASS-F
AA-UW-4(FD)		7.6	397	190	914	16.1	81		2930	306	0.82	13	0.075 D	3700	5710	19.8	15.6	39.8	0.412	1.33	0.00	61.0	8.62	0.043	0.21	7.5E-04	76	71	3.0	PASS-UF
AA-UW-4(FD)(FILTER)	X		395	197	904	16	86		2900	305	0.85	13	0.076 D			19.7	16.2	39.3	0.409	1.41	0.00	60.4	8.59	0.045	0.21	7.6E-04	76	71	3.4	PASS-F
AA-UW-5		7.6	90.2	45.4	119	9.03	116 J		222	160	0.66	13	0.051 D	700	1400 J	4.50	3.73	5.18	0.231	1.90	0.00	4.62	4.51	0.035	0.21	5.1E-04	14	11	9.5	FAIL-UF
AA-UW-5 (FILTER)	X		89.4	44.9	114	8.74	116 J		225	162	0.66	13	0.054 D			4.46	3.69	4.96	0.224	1.90	0.00	4.68	4.56	0.035	0.21	5.4E-04	13	11	7.8	FAIL-F
AA-UW-5(FD)		7.5	91.8	46.9	122	9.08	116 J		227	166	0.66	13	0.056 D	600	1390 J	4.58	3.86	5.31	0.232	1.90	0.00	4.73	4.68	0.035	0.21	5.6E-04	14	12	9.5	FAIL-UF
AA-UW-5(FD) (FILTER)	X		93.3	45.9	118	8.67	115 J		234	159	0.61	14	0.054 D			4.66	3.77	5.13	0.222	1.88	0.00	4.87	4.48	0.032	0.22	5.4E-04	14	11	9.1	FAIL-F
AA-UW-6		7.6	384	151	342	62.4	66		2240	201	0.57	8.8	0.05 D	3700	4280	19.2	12.4	14.9	1.60	1.08	0.00	46.6	5.66	0.030	0.14	5.0E-04	48	54	5.4	FAIL-UF
AA-UW-6 (FILTER)	X		421	184	441	80.1	64		2260	200	0.56	9.3	0.052 D			21.0	15.1	19.2	2.05	1.05	0.00	47.1	5.63	0.029	0.15	5.2E-04	57	54	3.1	PASS-F
BEC-6		7	575 L	256	720	48.4	58 J		2400 J	1570	0.2 U	30	15 D	7300	5980 J	28.7	21.1	31.3	1.24	0.951	0.00	50.0	44.2	0.011	0.48	0.15	82	96	7.6	FAIL-UF
BEC-6 (FILTER)	X		592 L	253	660	41	58 J		2450 J	1530	0.2 U	29	15 D		5920 J	29.5	20.8	28.7	1.05	0.951	0.00	51.0	43.1	0.011	0.47	0.15	80	96	8.9	FAIL-F
BEC-9		7.1	716	283	514	49.2	134		1920	1290	0.62	40	0.27	5300	6650	35.7	23.3	22.4	1.26	2.20	0.00	40.0	36.3	0.033	0.65	2.7E-03	83	79	2.1	PASS-UF
BEC-9(FILTERED)	X		728	290	512	49.7	135		1940	1280	0.61	39	0.27			36.3	23.8	22.3	1.27	2.21	0.00	40.4	36.1	0.032	0.63	2.7E-03	84	79	2.7	PASS-F
COH-1		8.2	490 L	8190	18700	6380	100 J		44600 J	24800	1 U	0.50 U	2 U	117000	155000 J	24.5	674	813	163	1.64	0.00	929	699	0.053	8.1E-03	0.020	1675	1629	1.4	PASS-UF
COH-1 (FILTER)	X		500 L	7750	17300	6160	99.6 J		42400 J	23900	1 U	0.50 U	0.011 J D		155000 J	25.0	637	753	158	1.63	0.00	883	673	0.053	8.1E-03	1.1E-04	1572	1558	0.5	PASS-F
COH-2		7.5	560	7400	17000 L	4830	95		35400	24600 J	1 U	0.50 U	0.2 U	89900	85000	27.9	609	739	124	1.56	0.00	737	693	0.053	8.1E-03	2.0E-03	1499	1432	2.3	PASS-UF
COH-2 (FILTERED)	X		569	7330	16000 L	4710	96		33900	22300 J	1 U	0.50 U	0.2 U			28.4	603	696	120	1.57	0.00	706	628	0.053	8.1E-03	2.0E-03	1448	1336	4.0	PASS-F
COH-2A		7.3	332	207	1130 J	45.9	350 J		1980	1410	0.76	1.1	5.4 D	3300	7510 J	16.6	17.0	49.2	1.17	5.74	0.00	41.2	39.7	0.040	0.018	0.054	84	87	1.7	PASS-UF

2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Comparison of Filtered and Unfiltered Samples

Well	Filtered	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations										Cation-Anion Balance Tests			
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cations	Sum Anions	(Cat-An)/ (Cat+An)	Acceptable Variance <5%? (3)
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50				
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)	(meq/meq)				
			(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)			(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(%)	
COH-2A (FILTER)	X		324	197	1120 J	38.6	302 J		1940	1450	0.69	1.1	4.8 D			16.2	16.2	48.7	0.987	4.95	0.00	40.4	40.8	0.036	0.018	0.048	82	86	2.5	PASS-F
DBMW-1		7.1	587	269	759	59.5	63 J		2930	1090 J	0.61	9.5	6.7 D	8600	7490	29.3	22.1	33.0	1.52	1.03	0.00	61.0	30.7	0.032	0.15	0.067	86	93	3.9	PASS-UF
DBMW-1(FILTER)	X		606	272	719	55.8	54 J		2960	1080 J	0.67	9.4	7.1 D			30.2	22.4	31.3	1.43	0.885	0.00	61.6	30.4	0.035	0.15	0.071	85	93	4.4	PASS-F
DBMW-10		5.3	223	88.7	273	63.6 J	89.6 J		985 J	338 J	0.59	9.8	0.5 D	3300	2800 J	11.1	7.29	11.9	1.63	1.47	0.00	20.5	9.52	0.031	0.16	5.0E-03	32	32	0.4	PASS-UF
DBMW-10 (FILTER)	X		202	87.2	274	65.3 J	120 J		987	299 J	0.57	9.8	0.52 D		2790 J	10.1	7.17	11.9	1.67	1.97	0.00	20.5	8.42	0.030	0.16	5.2E-03	31	31	0.5	PASS-F
DBMW-11		7.4	699	519	839	279	64.4 J		3040 J	1870	0.01 U	20	14 B D	5400	10400 J	34.9	42.7	36.5	7.14	1.06	0.00	63.3	52.7	5.3E-04	0.32	0.14	121	117	1.6	PASS-UF
DBMW-11 (FILTER)	X		703	444	798	214	65.2 J		2800 J	1810	0.01 U	20	14 B D		10200 J	35.1	36.5	34.7	5.47	1.07	0.00	58.3	51.0	5.3E-04	0.31	0.14	112	111	0.4	PASS-F
DBMW-12		6.1	573	581	668	315	67.6 J		3350 J	1320	0.36 B	18	12 D	6600	8070 J	28.6	47.8	29.1	8.06	1.11	0.00	69.7	37.2	0.019	0.29	0.12	113	108	2.3	PASS-UF
DBMW-12 (FILTER)	X		546	491	570	258	67.2 J		3300 J	1290	0.34 B	17	11 D		8100 J	27.2	40.4	24.8	6.60	1.10	0.00	68.7	36.3	0.018	0.27	0.11	99	107	3.7	PASS-F
DBMW-12(FD)		6.2	562	504	578	264	67.6 J		3240 J	1270	0.34 B	17	12 D	5800	8080 J	28.0	41.4	25.1	6.75	1.11	0.00	67.5	35.8	0.018	0.28	0.12	101	105	1.6	PASS-UF
DBMW-12(FD) (FILTER)	X		578	522	591	266	66.4 J		3280 J	1330	0.39 B	17	9.8 D		8100 J	28.8	42.9	25.7	6.80	1.09	0.00	68.3	37.5	0.021	0.28	0.098	104	107	1.4	PASS-F
DBMW-13		5.4	596	260	696	144 J	48 J		2700 J	901 J	0.01 U	17	9.7 D	7400	6660 J	29.7	21.4	30.3	3.68	0.787	0.00	56.2	25.4	5.3E-04	0.27	0.097	85	83	1.4	PASS-UF
DBMW-13 (FILTER)	X		613	264	700	143 J	54.4 J		2750 J	906 J	0.01 U	17	9.8 D		6700 J	30.6	21.7	30.4	3.66	0.892	0.00	57.3	25.5	5.3E-04	0.27	0.098	86	84	1.4	PASS-F
DBMW-14		5.5	626	228	644	142 J	58 J		2490 J	912 J	0.04 B	17	14 D	7100	6540 J	31.2	18.8	28.0	3.63	0.951	0.00	51.8	25.7	2.1E-03	0.27	0.14	82	79	1.7	PASS-UF
DBMW-14 (FILTER)	X		610	221	638	140 J	54 J		2450 J	910 J	0.05 B	17	14 D		6510 J	30.4	18.2	27.8	3.58	0.885	0.00	51.0	25.6	2.6E-03	0.27	0.14	80	78	1.3	PASS-F
DBMW-15		7.5	559	204	501	108	53.6 J		2550	375	0.3	8.4	1.3 B D	3700	5020 J	27.9	16.8	21.8	2.76	0.878	0.00	53.1	10.6	0.016	0.14	0.013	69	65	3.4	PASS-UF
DBMW-15 (FILTER)	X		562	206	508	98.1	53.6 J		2530	390	0.3	8.5	1.4 B D		5000 J	28.0	16.9	22.1	2.51	0.878	0.00	52.7	11.0	0.016	0.14	0.014	70	65	3.6	PASS-F
DBMW-16		5.6	79.6	31.1	170	19.7	74 J		565 J	148 J	0.73	2.1	0.015 B D	1070	1020 J	3.97	2.56	7.39	0.504	1.21	0.00	11.8	4.17	0.038	0.034	1.5E-04	14	17	8.8	FAIL-UF
DBMW-16 (FILTER)	X		82.1	31.6	176	20.2	70 J		550 J	161 J	0.71	2.0	0.016 B D		1020 J	4.10	2.60	7.66	0.517	1.15	0.00	11.5	4.54	0.037	0.032	1.6E-04	15	17	7.3	FAIL-F
DBMW-17		6.4	267	65.6	261	27.3	496 J		1130 J	43.6 J	0.56	1.9	0.012 B D	700	1100 J	13.3	5.39	11.4	0.698	8.13	0.00	23.5	1.23	0.029	0.031	1.2E-04	31	33	3.4	PASS-UF
DBMW-17 (FILTER)	X		263	64.8	259	27.3	496 J		1140 J	43.1 J	0.56	1.8	0.02 U		1060 J	13.1	5.33	11.3	0.698	8.13	0.00	23.7	1.21	0.029	0.029	2.0E-04	30	33	4.3	PASS-F
DBMW-19		5.5	593	307	705	95.1	166 J		2660 J	1100	0.62 B	19	5.8 D	4300	7010 J	29.6	25.2	30.7	2.43	2.72	0.00	55.4	31.0	0.033	0.31	0.058	88	89	0.9	PASS-UF
DBMW-19 (FILTER)	X		584	300	724	96.5	124 J		2680 J	1100	0.44 B	20	6.5 D		7100 J	29.1	24.7	31.5	2.47	2.03	0.00	55.8	31.0	0.023	0.31	0.065	88	89	0.8	PASS-F
DBMW-2		7.5	548	302 J	981 J	71.1 J	68.2 J		3240	1240	0.54	7.0	7.5 D	6400	7590	27.3	24.8	42.7	1.82	1.12	0.00	67.5	34.9	0.028	0.11	0.075	97	104	3.5	PASS-UF
DBMW-2 (FILTER)	X		545	298 J	974 J	67.2 J	68 J		3170	1240	0.65	5.9	6.8 D			27.2	24.5	42.4	1.72	1.11	0.00	66.0	34.9	0.034	0.095	0.068	96	102	3.3	PASS-F
DBMW-20		6.9	580	244	585	120	122 J		2120	961	0.22	17	3.2 B D	4100	6060 J	28.9	20.1	25.4	3.07	2.00	0.00	44.1	27.1	0.012	0.28	0.032	78	74	2.6	PASS-UF
DBMW-20 (FILTER)	X		567	237	568	117	121 J		2070	943	0.23	18	2.7 B D		6050 J	28.3	19.5	24.7	2.99	1.98	0.00	43.1	26.6	0.012	0.29	0.027	75	72	2.4	PASS-F
DBMW-22		6.9	484 L	171	283	148	34 J		2400 J	271	0.33	1.1	0.13 D	5000	4010 J	24.2	14.1	12.3	3.79	0.557	0.00	50.0	7.63	0.017	0.018	1.3E-03	54	58	3.5	PASS-UF
DBMW-22 (FILTER)	X		519 L	177	277	140	32.4 J		2360 J	271	0.31	1.1	0.13 D		4000 J	25.9	14.6	12.0	3.58	0.531	0.00	49.1	7.63	0.016	0.018	1.3E-03	56	57	1.1	PASS-F
DBMW-22(FD)		6.8	478 L	170	286	147	33.2 J		2390 J	269	0.25	1.1	0.13 D	5100	3990 J	23.9	14.0	12.4	3.76	0.544	0.00	49.8	7.58	0.013	0.018	1.3E-03	54	58	3.5	PASS-UF
DBMW-22(FD) (FILTER)	X		515 L	176	275	139	31.6 J		2360 J	273	0.31	1.1	0.14 D		4020 J	25.7	14.5	12.0	3.55	0.518	0.00	49.1	7.69	0.016	0.018	1.4E-03	56	57	1.5	PASS-F
DBMW-3		7.6	562	367 J	970 J	104 J	56.4 J		3230	1410	0.24	15	7.6 D	6600	8350	28.0	30.2	42.2	2.66	0.924	0.00	67.2	39.7	0.013	0.25	0.076	103	108	2.4	PASS-UF
DBMW-3 (FILTER)	X		572	377 J	1000 J	107 J	58 J		3300	1480	0.21	16	7.6 D			28.5	31.0	43.5	2.74	0.951	0.00	68.7	41.7	0.011	0.26	0.076	106	112	2.7	PASS-F
DBMW-4		7.5	631	237	681	84.8	90.8 J		2610	952	0.092 B	28	4.1 D	4400	6590 J	31.5	19.5	29.6	2.17	1.49	0.00	54.3	26.8	4.8E-03	0.45	0.041	83	83	0.2	PASS-UF
DBMW-4(FILTER)	X		627	235	672	84	91.2 J		2570	938	0.13	26	4.3 D			31.3	19.3	29.2	2.15	1.49	0.00	53.5	26.4	6.8E-03	0.43	0.043	82	82	0.1	PASS-F
DBMW-7		5.3	658	289	617	71.8	65.2 J		2410	1430	0.01 U	43	3.1 D	6900	7510 J	32.8	23.8	26.8	1.84	1.07	0.00	50.2	40.3	5.3E-04	0.69	0.031	85	92	3.9	PASS-UF
DBMW-7 (FILTER)	X		700	295	650	78.9	146 J		2340	1420	0.01 U	42	3.2 D		7530 J	34.9	24.3	28.3	2.02	2.39	0.00	48.7	40.0	5.3E-04	0.68	0.032	89	92	1.3	PASS-F
DBMW-7 (FD)		5.4	698	301	662	81.1	131 J		2420	1440	0.01 U	41	3.3 D	8100	7520 J	34.8	24.8	28.8	2.07	2.15	0.00	50.4	40.6	5.3E-04	0.66	0.033	90	94	1.8	PASS-UF
DBMW-7 (FD) (FILTER)	X		685	289	634	77	143 J		2370	1430	0.01 U	40	3.2 D		7540 J	34.2	23.8	27.6	1.97	2.34	0.00	49.3	40.3	5.3E-04	0.64	0.032	87	93	2.9	PASS-F
DBMW-9		7.4	560	138	307	63.6	78.8 J		2010 J	398 J	0.58	17	1.3 D	6700	4360 J	27.9	11.3	13.4	1.63	1.29	0.00	41.8	11.2	0.031	0.27	0.013	54	55	0.4	PASS-UF
DBMW-9 (FILTER)	X		534	131	291	57.9	78.8 J		2100 J	394 J	0.57	16	2.7 D		4340 J	26.6	10.8	12.7	1.48	1.29	0.00	43.7	11.1	0.030	0.26	0.027	52	56	4.5	PASS-F
DM-1		5.8	570	168	570	13.8	273 J		2310 J	346	0.77	19	0.27 B D	2400	5020 J	28.4	13.8	24.8	0.353	4.47	0.00	48.1	9.75	0.041	0.31	2.7E-03	67	63	3.6	PASS-UF
DM-1 (FILTER)	X		574	169	576	13.5	263 J		2290 J	340	0.81	19	0.28 B D		5100 J	28.6	13.9	25.1	0.345	4.31	0.00	47.7	9.58	0.043	0.31	2.8E-03	68	62	4.6	PASS-F
HMW-09		8.2	639 L	247	872	80.5	132 J		2720 J	1280	0.68 B	18	4.1 D	7800	5100 J	31.9	20.3	37.9	2.06	2.16	0.00	56.6	36.1	0.036	0.30	0.041	92	95	1.6	PASS-UF
HMW-09 (FILTER)	X		659 L	246	809	71	130 J		2660 J	1250	0.65 B	18	6.2 D		5210 J	32.9	20.2	35.2	1.82	2.13	0.00	55.4	35.2	0.034	0.30	0.062	90	93	1.6	PASS-F
HMWWT-6		7.7	134	75.3 J	180 J	6.6 J	79.6 J		435	375	0.66	15	0.069 D	1600	2240	6.69	6.19	7.83	0.169	1.30	0.00	9.06	10.6	0.035	0.25	6.9E-04	21	21	0.8	PASS-UF
HMWWT-6 (FILTER)	X		132	74.9 J	179 J	6.25 J	79 J		432	384	0.69	15	0.071 D			6.59	6.16	7.79	0.160	1.29	0.00	8.99	10.8	0.036	0.25	7.1E-04	21	21	1.7	PASS-F
MCF-01A		6.9	490	146 J	417 J	23.9	35		2530	121	0.24	5.0E-03 U	0.00017 J	3900	4240	24.5	12.0	18.1	0.611	0.574	0.00	52.7	3.41	0.013	8.1E-05	1.7E-06	55	57	1.3	PASS-UF
MCF-01A (FILTERED)	X		493	146 J	423 J	23.9	34		2550	108	0.25	5.0E-03 U	0.02 U			24.6	12.0	18.4	0.611	0.557	0.00	53.1	3.04	0.013	8.1E-05	2.0E-04	56	57	1.0	PASS-F
MCF-01B		7.2	111	63.9	391	10.7	127		889	271	0.65	1.9	0.7 D	1990	2740	5.54	5.25	17.0	0.274	2.08	0.00	18.5	7.63	0.034	0.031	7.0E-03	28	28	0.4	PASS-UF
MCF-01B (FILTERED)	X		108	62.2	381	10.3	125		950	293	0.64	1.5	0.7 D			5.39	5.12	16.6	0.263	2.05	0.00	19.8	8.25	0.034	0.024	7.0E-03	27	30	4.9	PASS-F
MCF-02A		7.6	21.2	6.49	166 J	10.1	72		183	124	0.81	1.0	0.00051	1100	974	1.06	0.534	7.22	0.258	1.18	0.00	3.81	3.49	0.043	0.016	5.1E-06	9	9	3.0	FAIL-UF
MCF-02A (FILTERED)	X		21.2	6.48	167 J	10	76		181	120	0.84	1.1	0.00022 J			1.06	0.533	7.26	0.256	1.25	0.00	3.77	3.38	0.044	0.018	2.2E-06	9	8	3.7	FAIL-F
MCF-02B		7.6	23.9	9.01	194 J	9.49	98		263	97.5	1.3	1.4	0.00013 J	2200	1090	1.19	0.741	8.44	0.243	1.61	0.00	5.48	2.75	0.068	0.023	1.3E-06	11	10	3.4	FAIL-UF
MCF-02B (FILTERED)	X		23	8.73	192 J	9.29	96		264	97.6	1.3	1.5	0.00022 J			1.15	0.718	8.35	0.238	1.57	0.00	5.50	2.75	0.068	0.024	2.2E-06	10	10	2.7	FAIL-F
MCF-03A		7.8	26.8	11.1	188 L	13	67		225	141 J	0.85	2.2	0.0011 B D	700	1170	1.34	0.913	8.18	0.332	1.10	0.00	4.68	3.97	0.045	0.036	1.1E-05	11	10	4.5	FAIL-UF
MCF-03A (FILTERED)	X		25.5	10.4	192 L	12.7	66		223	136 J	0.84	2.2	0.001 B D			1.27	0.855	8.35	0.325	1.08	0.00	4.64	3.83	0.044	0.036	1.0E-05	11	10	5.7	FAIL-F
MCF-03B		7.8	150	88.2	532	12.9	130		1220	314	0.79	11	0.084 B D	1900	3360	7.49	7.25	23.1	0.330	2.13	0.00	25.4	8.85	0.042	0.18	8.4E-04	38	37	2.1	PASS-UF
MCF-03B(FILTERED)	X		154	89	541	12.9	131		1190	309	0.8	11	0.083			7.68	7.32	23.5	0.330	2.15	0.00	24.8	8.70	0.042	0.18	8.3E-04	39	36	4.0	PASS-F
MCF-04		7.3	496	131	719	90.9	41		2830 J	416	0.44	5.0E-03 U	0.2 U	64700	5570	24.8	10.8	31.3	2.32	0.672	0.00	58.9	11.7	0.023	8.1E-05	2.0E-03	69	71	1.6	PASS-UF
MCF-04(FILTER)	X		476	127	720	90.8	40		3180 J	529	0.41	5.0E-03 U	0.2 U			23.8	10.4	31.3	2.32	0.656	0.00	66.2	14.9	0.022	8.1E-05	2.0E-03	68	82	9.3	FAIL-F
MCF-05		7.7	470	15300	19500	13300	127		80900 J	30900	1 U	0.50 U	0.4 U	180000	105000	23.5	1.26E+03	848	340	2.08	0.00	1.68E+03	870	0.053	8.1E-03	4.0E-03	2470	2557	1.7	PASS-UF
MCF-05(FILTER)	X		468	15000	19800	12900	136		76200 J	30400	1 U	0.50 U	0.4 U			23.4	1.23E+03	861	330	2.23	0.00	1.59E+03	856	0.053	8.1E-03	4.0E-03	2448	2445	0.1	PASS-F
MCF-06A-R		6.6	250	15800	37800 J	10800	90.4 J		70700	62000	1 U	0.50 U	1 U	178000	137000 J	12.5	1.30E+03	1.64E+03	276	1.48	0.00	1.47E+03	1.75E+03	0.053	8.1E-03	0.010	3232	3220	0.2	PASS-UF
MCF-06A-R (FILTER)	X		324	16500	37800 J	11400	90.8 J		70100	62900	1 U	0.50 U	0.0038 J D			16.2	1.36E+03	1.64E+03	292	1.49	0.00	1.46E+03	1.77E+03	0.053	8.1E-03	3.8E-05	3309	3233	1.2	PASS-F
MCF-06B		8.2	475	3760	4120	3860	94		19600 J	8030	1 U	3.9	4.3 D	11500	39600	23.7	309	179	98.7	1.54	0.00	408	226	0.053	0.063	0.043	611	636	2.0	PASS-UF
MCF-06B(FILTER)	X		482	3820	4230	4110	87		19800 J	8100	1 U	3.6	4.6 D			24.1	314	184	105	1.43	0.00	412	228	0.053	0.058	0.046	627	642	1.2	PASS-F
MCF-06C		7.3	663	357	688 J	217	66 J		2500	1720	0.01 U	47	4.1 B D	6200	8740 J	33.1	29.4	29.9	5.55	1.08	0.00	52.1	48.5	5.3E-04	0.76	0.041	98	102	2.2	PASS-UF
MCF-06C (FILTER)	X		654	355	676 J	213	69.8 J		2530	1760	0.01 U	46	4.3 B D			32.6	29.2	29.4	5.45	1.14	0.00	52.7	49.6	5.3E-04	0.74	0.043	97	104	3.7	PASS-F
MCF-07		7	434	15200	29500 J	11900	137 J		83300	41500	1 U	0.50 U	0.093 D	166000	127000 J	21.7	1.25E+03	1.28E+03	304	2.25	0.00	1.73E+03	1.17E+03	0.053	8.1E-03	9.3E-04	2859	2906	0.8	PASS-UF
MCF-07 (FILTER)	X		450	15600	30400 J	12000	152 J		80700	41900	1 U	0.50 U	0.1 D			22.5	1.28E+03	1.32E+03	307	2.49	0.00	1.68E+03	1.18E+03	0.053	8.1E-03	1.0E-03	2935	2863	1.2	PASS-F
MCF-08A		7.3	608	5650	26200	3010	98.4 J		26200	51200 J	1 U	0.50 U	0.2 U	99800	116000	30.3	465	1.14E+03	77.0	1.61	0.00	545	1.44E+03	0.053	8.1E-03	2.0E-03	1712	1989	7.5	FAIL-UF
MCF-08A(FILTER)	X		667	6740	30600	3500	98.2 J		26600	51900 J	1 U	0.50 U	0.2 U			33.3	554	1.33E+03	89.5	1.61	0.00	554	1.46E+03	0.053	8.1E-03	2.0E-03	2008	2017	0.2	PASS-F
MCF-08B-R		7.2	509	1890	5790 J	837	70		11400	7830	0.1 U	0.050 U	0.00013 J	24800	31400	25.4	155	252	21.4	1.15	0.00	237	221	5.3E-03	8.1E-04	1.3E-06	454	459	0.5	PASS-UF

2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Comparison of Filtered and Unfiltered Samples

Well	Filtered	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations										Cation-Anion Balance Tests			
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cations	Sum Anions	(Cat-An)/(Cat+An)	Acceptable Variance <5%? (3)
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50				
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(meq/l)	(meq/l)	(%)	
MCF-08B-R (FILTERED)	X		496	1720	5310 J	756	69		10500	7230	0.1 U	0.050 U	0.00017 J			24.8	141	231	19.3	1.13	0.00	219	204	5.3E-03	8.1E-04	1.7E-06	417	423	0.8	PASS-F
MCF-08B-R (FD)		7.4	507	1800	5570 J	793	76		10900	7660	0.1 U	0.098 B	0.00024 J	30700	32900	25.3	148	242	20.3	1.25	0.00	227	216	5.3E-03	1.6E-03	2.4E-06	436	444	0.9	PASS-UF
MCF-08B-R (FD)(FILTERED)	X		511	1780	5520 J	782	69		10500	7390	0.1 U	0.050 U	0.0014			25.5	146	240	20.0	1.13	0.00	219	208	5.3E-03	8.1E-04	1.4E-05	432	428	0.5	PASS-F
MCF-09A		7.4	488	1880	5180	650	81		15900	5110	0.1 U	0.050 U	0.1 U	22100	27100	24.4	155	225	16.6	1.33	0.00	331	144	5.3E-03	8.1E-04	1.0E-03	421	476	6.2	FAIL-UF
MCF-09A(FILTERED)	X		500	1930	5270	658	75		19700	6490	0.1 U	0.050 U	0.1 U			25.0	159	229	16.8	1.23	0.00	410	183	5.3E-03	8.1E-04	1.0E-03	430	594	16.1	FAIL-F
MCF-09B		7.3	445	123	401	45	71		2150	149	0.72	0.023	0.1 U	3000	3910	22.2	10.1	17.4	1.15	1.16	0.00	44.8	4.20	0.038	3.7E-04	1.0E-03	51	50	0.7	PASS-UF
MCF-09B(FD)(FILTERED)	X		445	123	399	44.1	69		2100	148	0.79	5.0E-03 U	0.1 U			22.2	10.1	17.4	1.13	1.13	0.00	43.7	4.17	0.042	8.1E-05	1.0E-03	51	49	1.7	PASS-F
MCF-09B(FD)		7.3	431	118	389	42.8	70		2120	146	0.79	5.0E-03 U	0.1 U	2200	3920	21.5	9.70	16.9	1.09	1.15	0.00	44.1	4.11	0.042	8.1E-05	1.0E-03	49	49	0.2	PASS-UF
MCF-09B(FILTERED)	X		438	121	394	43.7	69		2120	149	0.74	5.0E-03 U	0.1 U			21.9	9.95	17.1	1.12	1.13	0.00	44.1	4.20	0.039	8.1E-05	1.0E-03	50	50	0.6	PASS-F
MCF-10A		7.8	528	235	1320	176	36 J		3920	1620 J	0.2	5.0E-03 U	3.1E-05 J	4200	9430	26.3	19.3	57.4	4.50	0.590	0.00	81.6	45.6	0.011	8.1E-05	3.1E-07	108	128	8.6	FAIL-UF
MCF-10A(FILTER)	X		535	241	1360	182	38 J		3900	1350 J	0.16	5.0E-03 U	0.02 U			26.7	19.8	59.2	4.65	0.623	0.00	81.2	38.0	8.4E-03	8.1E-05	2.0E-04	110	120	4.1	PASS-F
MCF-10B		7.5	253	102	237	38.9	51		1140	205	0.39	0.093	0.00032 J	2200	2700	12.6	8.39	10.3	0.995	0.836	0.00	23.7	5.77	0.021	1.5E-03	3.2E-06	32	30	3.1	PASS-UF
MCF-10B(FILTERED)	X		254	104	234	38.8	52		1120	205	0.39	0.097	0.00035 J			12.7	8.55	10.2	0.992	0.852	0.00	23.3	5.77	0.021	1.6E-03	3.5E-06	32	30	3.9	PASS-F
MCF-11		7.4	425	129	459	63.5	100		1960	348	1.2	5.0E-03 U	0.1 U	2700	4190	21.2	10.6	20.0	1.62	1.64	0.00	40.8	9.80	0.063	8.1E-05	1.0E-03	53	52	1.0	PASS-UF
MCF-11(FILTERED)	X		411	124	453	62.9	99		1920	344	1.2	5.0E-03 U	0.00022 J			20.5	10.2	19.7	1.61	1.62	0.00	40.0	9.69	0.063	8.1E-05	2.2E-06	52	51	0.6	PASS-F
MCF-12A		7.4	518	204	1040	398	77		3440	931	0.32	5.0E-03 U	4.9E-05 J	7300	7820	25.8	16.8	45.2	10.2	1.26	0.00	71.6	26.2	0.017	8.1E-05	4.9E-07	98	99	0.6	PASS-UF
MCF-12A (FILTER)	X		500	198	1000	382	48		3260	921	0.33	5.0E-03 U	0.02 U			25.0	16.3	43.5	9.77	0.787	0.00	67.9	25.9	0.017	8.1E-05	2.0E-04	94	95	0.1	PASS-F
MCF-12B		7.4	302	136	326 J	82	58		1560	317	0.52	6.6	4 D	2900	3640	15.1	11.2	14.2	2.10	0.951	0.00	32.5	8.93	0.027	0.11	0.040	43	43	0.0	PASS-UF
MCF-12B (FILTERED)	X		293	131	319 J	79.6	60		1550	317	0.55	6.6	18 D			14.6	10.8	13.9	2.04	0.983	0.00	32.3	8.93	0.029	0.11	0.18	41	43	1.4	PASS-F
MCF-12C		7.2	209	82.5	207 J	73.9	72		1230	115	0.47	1.5	0.43 D	1000	2520	10.4	6.78	9.00	1.89	1.18	0.00	25.6	3.24	0.025	0.024	4.3E-03	28	30	3.4	PASS-UF
MCF-12C (FILTERED)	X		212	83.7	210 J	74.9	71		1210	116	0.46	1.5	0.47 D			10.6	6.88	9.13	1.92	1.16	0.00	25.2	3.27	0.024	0.024	4.7E-03	29	30	2.0	PASS-F
MCF-16B		7.8	543	6020	3360	16300	146 J		42800	2450	1 U	0.50 U	0.0055 J B D	64300	55700 J	27.1	495	146	417	2.39	0.00	891	69.0	0.053	8.1E-03	5.5E-05	1085	963	6.0	FAIL-UF
MCF-16B (FILTER)	X		528	5900	3350	15600	146 J		42400	2420	1 U	0.50 U	2 U		55100 J	26.3	485	146	399	2.39	0.00	883	68.2	0.053	8.1E-03	0.020	1056	953	5.1	FAIL-F
MCF-16C		7.4	601	600	602	308	83.6 J		6290	1050	0.43 B	17	8.7 B D	11500	11200 J	30.0	49.3	26.2	7.88	1.37	0.00	131	29.6	0.023	0.27	0.087	113	162	17.7	FAIL-UF
MCF-16C (FILTER)	X		625	493	575	213	74.4 J		3050	1050	0.52 B	21	11 B D		11300 J	31.2	40.5	25.0	5.45	1.22	0.00	63.5	29.6	0.027	0.34	0.11	102	95	3.8	PASS-F
MCF-18A		6.4	2670	2680	58900 J	7090	28 J		3590	114000	1 U	0.50 U	0.0061 J D	163000	196000 J	133	220	2.56E+03	181	0.459	0.00	74.7	3.21E+03	0.053	8.1E-03	6.1E-05	3097	3287	3.0	PASS-UF
MCF-18A (FILTER)	X		2570	2580	57500 J	6870	28 J		3630	106000	1 U	0.50 U	0.0075 J D			128	212	2.50E+03	176	0.459	0.00	75.6	2.99E+03	0.053	8.1E-03	7.5E-05	3017	3062	0.7	PASS-F
MCF-18A (FD)		6.1	2660	2760	60000 J	7310	27.6 J		3500	112000	1 U	0.50 U	0.0092 J D	173000	195000 J	133	227	2.61E+03	187	0.452	0.00	72.9	3.15E+03	0.053	8.1E-03	9.2E-05	3156	3228	1.1	PASS-UF
MCF-18A (FD)(FILTER)	X		2560	2640	53400 J	6910	28.4 J		3680	105000	1 U	0.50 U	0.0071 J D			128	217	2.32E+03	177	0.465	0.00	76.6	2.96E+03	0.053	8.1E-03	7.1E-05	2844	3035	3.2	PASS-F
MCF-19A		7.6	417	9270 J	20600 J	4920 J	116 J		56400	31900	1 U	0.50 U	2 U	115000	100000	20.8	762	896	126	1.90	0.00	1.17E+03	899	0.053	8.1E-03	0.020	1805	2075	7.0	FAIL-UF
MCF-19A (FILTER)	X		459	10200 J	22900 J	5310 J	128 J		57300	31600	1 U	0.50 U	2 U			22.9	839	996	136	2.10	0.00	1.19E+03	890	0.053	8.1E-03	0.020	1994	2085	2.2	PASS-F
MCF-19A (FD) (FILTER)	X		453	9990 J	22600 J	5300 J	123 J		58000	32000	1 U	0.50 U	2 U			22.6	822	983	136	2.02	0.00	1.21E+03	901	0.053	8.1E-03	0.020	1963	2111	3.6	PASS-F
MCF-19A FD		7.6	467	10300 J	23600 J	5410 J	116 J		58200	33000	1 U	0.50 U	2 U	119000	101000	23.3	847	1.03E+03	138	1.90	0.00	1.21E+03	930	0.053	8.1E-03	0.020	2035	2143	2.6	PASS-UF
MCF-20A		6.8	392	12200 J	29500 J	9470 J	90 J		70100	61300	1 U	0.50 U	2 U	174000	3840	19.6	1.00E+03	1.28E+03	242	1.47	0.00	1.46E+03	1.73E+03	0.053	8.1E-03	0.020	2548	3188	11.2	FAIL-UF
MCF-20A (FILTER)	X		393	12300 J	30000 J	8930 J	89.6 J		69200	57300	1 U	0.50 U	2 U			19.6	1.01E+03	1.30E+03	228	1.47	0.00	1.44E+03	1.61E+03	0.053	8.1E-03	0.020	2564	3056	8.8	FAIL-F
MCF-21A		7.2	574	12700	14900	12900	135		68600	16300	1 U	0.50 U	0.2 U	119000	86900	28.6	1.04E+03	648	330	2.21	0.00	1.43E+03	459	0.053	8.1E-03	2.0E-03	2051	1890	4.1	PASS-UF
MCF-21A (FILTERED)	X		548	12100	14500	12400	125		68800	16300	1 U	0.50 U	0.2 U			27.3	995	631	317	2.05	0.00	1.43E+03	459	0.053	8.1E-03	2.0E-03	1970	1894	2.0	PASS-F
MCF-22A		6.8	521 J	109 J	268 J	119 J	79.2 J		2450 J	134	0.68	5.0E-03 U	0.02 U	4400	3800 J	26.0	8.96	11.7	3.04	1.30	0.00	51.0	3.77	0.036	8.1E-05	2.0E-04	50	56	6.1	FAIL-UF
MCF-22A(FILTER)	X		536 J	112 J	274 J	111 J	76.8 J		2300 J	124	0.71	5.0E-03 U	0.02 U		3840 J	26.7	9.21	11.9	2.84	1.26	0.00	47.9	3.49	0.037	8.1E-05	2.0E-04	51	53	1.9	PASS-F
MCF-23A		6	512 J	7400	14700 J	3620	82.4 J		37700 J	15800	1 U	0.50 U	0.2 U	77300	68500 J	25.5	609	639	92.6	1.35	0.00	785	445	0.053	8.1E-03	2.0E-03	1366	1231	5.2	FAIL-UF
MCF-23A(FILTER)	X		488 J	7160	14300 J	3600	78.4 J		38200 J	16200	1 U	0.50 U	2 U		68200 J	24.4	589	622	92.1	1.28	0.00	795	456	0.053	8.1E-03	0.020	1327	1253	2.9	PASS-F
MCF-24A		6.2	512	12200	7950	15300	141		75100 J	10600	1 U	0.50 U	0.4 U	5300	77400	25.5	1.00E+03	346	391	2.31	0.00	1.56E+03	299	0.053	8.1E-03	4.0E-03	1766	1865	2.7	PASS-UF
MCF-24A(FILTER)	X		505	12300	7980	15500	162		89900 J	15800	1 U	0.50 U	0.4 U			25.2	1.01E+03	347	396	2.65	0.00	1.87E+03	445	0.053	8.1E-03	4.0E-03	1780	2320	13.2	FAIL-F
MCF-24B		6.3	324 J	2520	1470 J	4750	134 J		17400 J	1460	0.1 U	0.59	0.0045 J D	27500	25500 J	16.2	207	63.9	121	2.20	0.00	362	41.1	5.3E-03	9.5E-03	4.5E-05	409	406	0.4	PASS-UF
MCF-24B(FILTER)	X		350 J	1900	1280 J	3900	346 J		13900 J	1200	0.14 B	0.050 U	0.011 D		21800 J	17.5	156	55.7	99.7	5.67	0.00	289	33.8	7.4E-03	8.1E-04	1.1E-04	329	329	0.0	PASS-F
MCF-25A		6.3	470	157	1060	162	75		3660 J	601	0.25	5.0E-03 U	0.2 U	148000	9220	23.5	12.9	46.1	4.14	1.23	0.00	76.2	16.9	0.013	8.1E-05	2.0E-03	87	94	4.3	PASS-UF
MCF-25A(FILTER)	X		470	160	1060	167	70		3540 J	623	0.26	5.0E-03 U	2.5E-05 J			23.5	13.2	46.1	4.27	1.15	0.00	73.7	17.5	0.014	8.1E-05	2.5E-07	87	92	3.0	PASS-F
MCF-27		7.8	69.2	21.7	235	13.3	68 J		477	89.8	0.75	0.95	0.00079	600	1530 J	3.45	1.78	10.2	0.340	1.11	0.00	9.93	2.53	0.039	0.015	7.9E-06	16	14	7.4	FAIL-UF
MCF-27 (FILTER)	X		68.4	21.3	231	12.6	64.4 J		484	90.5	0.74	0.92	0.00076			3.41	1.75	10.0	0.322	1.06	0.00	10.1	2.55	0.039	0.015	7.6E-06	16	14	6.1	FAIL-F
MCF-28B		7.4	565	3850	9880	2190	80.4 J		22900 J	14800	0.2 U	0.10 U	2 U	45300	54900 J	28.2	317	430	56.0	1.32	0.00	477	417	0.011	1.6E-03	0.020	831	895	3.7	PASS-UF
MCF-28B (FILTER)	X		561	4160	11000	2370	80 J		22600 J	14900	0.2 U	0.10 U	1 U		54700 J	28.0	342	478	60.6	1.31	0.00	471	420	0.011	1.6E-03	0.010	909	892	1.0	PASS-F
MCF-29B		7.5	538 J	9910 J	24800 J	11500 J	116 J		53200 J	35100	1 U	0.50 U	0.4 U	119000	107000 J	26.8	815	1.08E+03	294	1.90	0.00	1.11E+03	989	0.053	8.1E-03	4.0E-03	2215	2098	2.7	PASS-UF
MCF-29B(FILTER)	X		540 J	9880 J	24400 J	11500 J	118 J		53400 J	34100	1 U	0.50 U	0.4 U		107000 J	26.9	813	1.06E+03	294	1.93	0.00	1.11E+03	961	0.053	8.1E-03	4.0E-03	2195	2074	2.8	PASS-F
MCF-30A		8.6	571 J	8700	41200 J	8690	147 J	102 J	27400 J	99600	1 U	0.50 U	0.2 U	175000	180000 J	28.5	715	1.79E+03	222	2.41	3.40	570	2.81E+03	0.053	8.1E-03	2.0E-03	2758	3382	10.2	FAIL-UF
MCF-30A(FILTER)	X		560 J	8640	45700 J	8850	121 J	84.8 J	27200 J	100000	1 U	0.50 U	0.2 U		177000 J	27.9	711	1.99E+03	226	1.98	2.83	566	2.82E+03	0.053	8.1E-03	2.0E-03	2953	3388	6.9	FAIL-F
MCF-30B		8.8	470 J	11700	31100 J	9990	186 J	120 J	66700 J	58700	1 U	0.50 U	2 U	168000	137000 J	23.5	962	1.35E+03	255	3.05	4.00	1.39E+03	1.65E+03	0.053	8.1E-03	0.020	2594	3049	8.1	FAIL-UF
MCF-30B(FILTER)	X		415 J	14900	37200 J	11300	130 J	119 J	69000 J	58700	1 U	0.50 U	2 U		136000 J	20.7	1.23E+03	1.62E+03	289	2.13	3.97	1.44E+03	1.65E+03	0.053	8.1E-03	0.020	3153	3096	0.9	PASS-F
MCF-31B		7.4	615 J	7160 J	24300 J	4230 J	126 J		31100 J	38400	1 U	0.50 U	0.4 U	89700	98400 J	30.7	589	1.06E+03	108	2.06	0.00	648	1.08E+03	0.053	8.1E-03	4.0E-03	1785	1731	1.5	PASS-UF
MCF-31B(FILTER)	X		582 J	6990 J	23900 J	4230 J	136 J		31600 J	38500	1 U	0.50 U	0.4 U		99600 J	29.0	575	1.04E+03	108	2.23	0.00	658	1.08E+03	0.053	8.1E-03	4.0E-03	1752	1745	0.2	PASS-F
MCF-32B		6	518	164	494	142	62.8 J		3190 J	342 J	0.23	9.2E-03 B	0.019 B D	2900	3210 J	25.8	13.5	21.5	3.63	1.03	0.00	66.4	9.63	0.012	1.5E-04	1.9E-04	64	77	8.9	FAIL-UF
MCF-32B (FILTER)	X		517	165	496	142	63.6 J		3360 J	366 J	0.23	5.0E-03 U	0.00016 J B D		3210 J	25.8	13.6	21.6	3.63	1.04	0.00	70.0	10.3	0.012	8.1E-05	1.6E-06	65	81	11.5	FAIL-F
MW-13		7	526	207	531 J	117	128 J		2070	908 J	0.51	21	2.1 D	3700	5840 J	26.2	17.0	23.1	2.99	2.10	0.00	43.1	25.6	0.027	0.34	0.021	69	71	1.3	PASS-UF
MW-13 (FILTER)	X		536	212	540 J	120	126 J		2090	908 J	0.57	21	2.2 D			26.7	17.4	23.5	3.07	2.06	0.00	43.5	25.6	0.030	0.34	0.022	71	72	0.6	PASS-F
MW-15		7.3	409	184	710 J	74.3	151 J		2450	472 J	2.5	0.026	8.4E-05 J	4300	5170 J	20.4	15.1	30.9	1.90	2.47	0.00	51.0	13.3	0.13	4.2E-04	8.4E-07	68	67	1.0	PASS-UF
MW-15 (FILTER)	X		397	150	661 J	62.6	148 J		2400	453 J	2.5	0.027	0.00028 J			19.8	12.3	28.8	1.60	2.43	0.00	50.0	12.8	0.13	4.4E-04	2.8E-06	62	65	2.2	PASS-F
MW-3		7.4	443	202	769 J	76.3	89 J		1990	1200	1.1	5.0E-03 U	0.1 B D	3100	6840 J	22.1	16.6	33.4	1.95	1.46	0.00	41.4	33.8	0.058	8.1E-05	1.0E-03	74	77	1.7	PASS-UF
MW-3 (FILTER)	X		434	198	766 J	76.1	97 J		1960	1200	1	0.071	7 D			21.7	16.3	33.3	1.95	1.59	0.00	40.8	33.8	0.053	1.1E-03	0.070	73	76	2.1	PASS-F
MW-4		7.4	518	974	2140	808	69 J		6880	4910	0.36 B	14	9.4 D	14400	17200 J	25.8	80.1	93.1	20.7	1.13	0.00	143	138	0.019	0.22	0.094	220	283	12.6	FAIL-UF
MW-4 (FILTER)	X		512	962	2120	799	70 J		5790	3590	0.36 B	13	8.7 D			25.5	79.1	92.2	20.4	1.15	0.00	121	101	0.019	0.21	0.087	217	223	1.3	PASS-F
PC-108		6.2	263	95.6	641	19.7	420 J		780	827	1.1	5.0E-03 U	0.00064	1700	4430 J	13.1	7.86	27.9	0.504	6.88	0.00	16.2	23.3	0.058	8.1E-05	6.4E-06	49	46	3.0	PASS-UF
PC-108 (FILTER)	X		255	91	624	18.4	407 J		781	810	1.1	5.0E-03 U	0.02 U			12.7	7.48	27.1	0.471	6.67	0.00	16.3	22.8	0.058	8.1E-05	2.0E-04	48	46	2.2	PASS-F
PC-2		7.4	453	305	989 J	60.6	87		2960	1130	0.59	11	4.8 D	6000	7460	22.6	25.1	43.0	1.55	1.43	0.00	61.6	31.8	0.031	0.18	0.048	92	95	1.5	PASS-UF
PC-2 (FILTERED)	X		444	299	987 J	60.1	84		2850	1110	0.62	11	4.5 D			22.2	24.6	42.9	1.54	1.38	0.00	59.3	31.3	0.033	0.18	0.045	91	92	0.6	PASS-F

2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Comparison of Filtered and Unfiltered Samples

Well	Filtered	pH	Major Ion Chemistry Data Input											TDS and EC Input		meq/l Calculations										Cation-Anion Balance Tests			
			Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	CO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cations	Sum Anions	(Cat-An)/ (Cat+An)	Acceptable Variance <5%? (3)
																20.04	12.16	22.99	39.10	61.02	30.01	48.03	35.50	19.00	61.91	99.50				
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)	(mg/meq)				
																(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(%)	
PC-24		7.1	835	379	1750 J	24.1	83		2100	3630 J	0.8 B	39	19 D	9800	13400	41.7	31.2	76.1	0.616	1.36	0.00	43.7	102	0.042	0.63	0.19	150	148	0.5	PASS-UF
PC-24 (FILTERED)	X		805	368	1690 J	23.5	79		2150	3580 J	0.77 B	40	22 D			40.2	30.3	73.5	0.601	1.29	0.00	44.8	101	0.041	0.65	0.22	145	148	1.1	PASS-F
PC-28		7.4	628	231	1130 J	10.6	93		2870	1200 J	0.77 B	42	500 D	6600	8440	31.3	19.0	49.2	0.271	1.52	0.00	59.8	33.8	0.041	0.68	5.0	100	101	0.5	PASS-UF
PC-28 (FILTERED)	X		632	222	1110 J	9.4	92		2850	1170 J	0.72 B	41	530 D			31.5	18.3	48.3	0.240	1.51	0.00	59.3	33.0	0.038	0.66	5.3	98	100	0.8	PASS-F
PC-4		7	574	341	1160 J	129	95		3110	1630	0.42	26	7.5 D	7400	9140	28.6	28.0	50.5	3.30	1.56	0.00	64.8	45.9	0.022	0.42	0.075	110	113	1.0	PASS-UF
PC-4 (FILTERED)	X		550	330	1120 J	130	89		3130	1660	0.42	25	7.3 D			27.4	27.1	48.7	3.32	1.46	0.00	65.2	46.8	0.022	0.41	0.073	107	114	3.3	PASS-F
PC-67		5.6	709	349	2940 J	25.2	144 J		3120	4300	1.4	48	53 B D	11000	18400 J	35.4	28.7	128	0.645	2.36	0.00	65.0	121	0.074	0.78	0.53	193	190	0.7	PASS-UF
PC-67 (FILTER)	X		728	352	3040 J	25.4	132 J		3070	4240	1.4	49	59 B D			36.3	28.9	132	0.650	2.16	0.00	63.9	119	0.074	0.79	0.59	198	187	2.9	PASS-F
PC-76		7.4	418	232	649 J	37.1	187 J		2010	908	0.93	2.7	0.84 D	4400	5820 J	20.9	19.1	28.2	0.949	3.06	0.00	41.8	25.6	0.049	0.044	8.4E-03	69	71	1.1	PASS-UF
PC-76 (FILTER)	X		407	230	645 J	38.7	185 J		1970	919	0.95	2.8	0.77 D			20.3	18.9	28.1	0.990	3.03	0.00	41.0	25.9	0.050	0.045	7.7E-03	68	70	1.3	PASS-F
PC-79		7.3	282	112	558	22.5	202		1110	687	1.1	0.64	3 D	4400	4330	14.1	9.21	24.3	0.575	3.31	0.00	23.1	19.4	0.058	0.010	0.030	48	46	2.4	PASS-UF
PC-79 (FILTER)	X		286	115	568	23.1	209		1100	687	1.2	0.62	2.9 D			14.3	9.46	24.7	0.591	3.43	0.00	22.9	19.4	0.063	0.010	0.029	49	46	3.4	PASS-F
PC-80		7.3	191	48.9	480	20.3	284		614	494	1.7	0.012	0.038 D	2500	3210	9.53	4.02	20.9	0.519	4.65	0.00	12.8	13.9	0.089	1.9E-04	3.8E-04	35	31	5.3	FAIL-UF
PC-80 (FILTER)	X		187	52.9	478	20.1	287		612	501	1.7	5.0E-03 U	0.044 D			9.33	4.35	20.8	0.514	4.70	0.00	12.7	14.1	0.089	8.1E-05	4.4E-04	35	32	5.0	FAIL-F
PC-81		7.3	121	54.9	725	27.4	324 J		971	703	3.7	0.019 B	0.02 U	1300	3960	6.04	4.51	31.5	0.701	5.31	0.00	20.2	19.8	0.19	3.1E-04	2.0E-04	43	46	3.1	PASS-UF
PC-81 (FILTER)	X		121	57	712	26.5	325 J		1000	715	3.7	0.018 B	0.02 U			6.04	4.69	31.0	0.678	5.33	0.00	20.8	20.1	0.19	2.9E-04	2.0E-04	42	46	4.6	PASS-F
PC-88		7.1	263	109	1150	30.1	271 J		1320	1460	1.5	6.1	7.5 D	5700	6320	13.1	8.96	50.0	0.770	4.44	0.00	27.5	41.1	0.079	0.099	0.075	73	73	0.3	PASS-UF
PC-88 (FILTER)	X		261	111	1090	28.2	266 J		1390	1550	1.5	6.3	6.9 D			13.0	9.13	47.4	0.721	4.36	0.00	28.9	43.7	0.079	0.10	0.069	70	77	4.7	PASS-F
PC-90			224	92.3	872 J	21.9	234 J		1160	1070	1.4	7.6	6.3 B D	2100		11.2	7.59	37.9	0.560	3.83	0.00	24.2	30.1	0.074	0.12	0.063	57	58	1.0	PASS-UF
PC-90 (FILTER)	X		229	94.2	876 J	21.4	239 J		1150	1070	1.4	8.1	6.6 B D			11.4	7.75	38.1	0.547	3.92	0.00	23.9	30.1	0.074	0.13	0.066	58	58	0.4	PASS-F
PC-94		7.1	628	259	780 J	61.5	116 J		2700	1190	0.66	19	5.7 B D	3100	7790 J	31.3	21.3	33.9	1.57	1.90	0.00	56.2	33.5	0.035	0.31	0.057	88	92	2.2	PASS-UF
PC-94 (FILTER)	X		641	262	794 J	60.4	115 J		2690	1190	0.59	19	5.3 B D			32.0	21.5	34.5	1.54	1.88	0.00	56.0	33.5	0.031	0.31	0.053	90	92	1.2	PASS-F
POD2-R		7.4	685	235	1080	27.7	103 J		2560	1570	0.92	21	7.9 D	5500	8870 J	34.2	19.3	47.0	0.708	1.69	0.00	53.3	44.2	0.048	0.33	0.079	101	100	0.8	PASS-UF
POD2-R (FILTER)	X		688	233	1080	28	102 J		2600	1570	0.89	22	7.5 D			34.3	19.2	47.0	0.716	1.67	0.00	54.1	44.2	0.047	0.36	0.075	101	101	0.3	PASS-F
POD-8		6.9	370	225 J	539 J	32.5 J	197 J		1900	753	0.72	25	0.31 D	900	5270	18.5	18.5	23.4	0.831	3.23	0.00	39.6	21.2	0.038	0.41	3.1E-03	61	64	2.6	PASS-UF
POD-8 (FILTER)	X		366	223 J	533 J	32.3 J	191 J		1860	726	0.71	25	0.31 D			18.3	18.3	23.2	0.826	3.13	0.00	38.7	20.5	0.037	0.41	3.1E-03	61	63	1.7	PASS-F
POU-3		7.4	806	378	1740	33.7	64.8 J		2460	2530	0.2 U	12	27 D	7600	11200 J	40.2	31.1	75.7	0.862	1.06	0.00	51.2	71.3	0.011	0.20	0.27	148	124	8.8	FAIL-UF
POU-3(FILTER)	X		665	305	1440	27	64 J		2400	2470	0.2 U	12	20 D			33.2	25.1	62.6	0.691	1.05	0.00	50.0	69.6	0.011	0.19	0.20	122	121	0.2	PASS-F
WMW5.58SD		7.5	473	11600	21300 J	14800	304 J		67700	28000	1 U	0.50 U	0.083 B D	142000	112000 J	23.6	954	926	379	4.98	0.00	1.41E+03	789	0.053	8.1E-03	8.3E-04	2283	2203	1.8	PASS-UF
WMW5.58SD (FILTER)	X		488	12000	21900 J	15000	307 J		67800	28100	1 U	0.50 U	0.062 B D			24.4	987	953	384	5.03	0.00	1.41E+03	792	0.053	8.1E-03	6.2E-04	2347	2208	3.1	PASS-F
WMW5.58SD (FD)		7.5	424	9080	17000 J	11700	305 J		67600	28400	1 U	0.50 U	0.067 B D	138000	114000 J	21.2	747	739	299	5.00	0.00	1.41E+03	800	0.053	8.1E-03	6.7E-04	1807	2213	10.1	FAIL-UF
WMW5.58SD (FD)(FILTER)	X		462	11200	21100 J	14100	301 J		67200	28000	1 U	0.50 U	0.065 B D			23.1	921	918	361	4.93	0.00	1.40E+03	789	0.053	8.1E-03	6.5E-04	2223	2193	0.7	PASS-F
WMW5.58SI		7.5	146	59.4 J	369 J	28.9 J	176 J		600	379	1.1	11	0.37 D	1100	133000	7.29	4.88	16.1	0.739	2.88	0.00	12.5	10.7	0.058	0.17	3.7E-03	29	26	4.8	PASS-UF
WMW5.58SI (FILTER)	X		132	56.8 J	361 J	28.1 J	171 J		615	380	1.1	11	0.39 D			6.59	4.67	15.7	0.719	2.80	0.00	12.8	10.7	0.058	0.17	3.9E-03	28	27	2.1	PASS-F
WMW5.58SS		7.5	117	52.3 J	252 J	28 J	153 J		503	307	0.86	14	0.012 D	1000	2220	5.84	4.30	11.0	0.716	2.51	0.00	10.5	8.65	0.045	0.22	1.2E-04	22	22	0.2	PASS-UF
WMW5.58SS (FILTER)	X		122	54.2 J	261 J	28.2 J	152 J		476	291	0.94	14	0.018 D			6.09	4.46	11.4	0.721	2.49	0.00	9.91	8.20	0.049	0.22	1.8E-04	23	21	4.0	PASS-F

Total Samples:	252
Passing:	205
Failing:	47
Total Unfiltered:	126
Passing Unfiltered:	97
Failing Unfiltered:	29
% Passing:	77.0
Total Filtered:	126
Passing Filtered:	108
Failing Filtered:	18
% Passing:	85.7

Summary of Cation-Anion Balance and Related Calculations
2009 Groundwater Sampling Event - BMI Common Areas - Eastside
Comparison of Field and Laboratory Measured Alkalinity

Well	Zone	pH	Major Ion Chemistry Data Input										TDS and EC Input		meq/l Calculations										Cation-Anion Balance Tests				TDS Checks		
			Ca	Mg	Na	K	HCO_3	SO_4	Cl	F	NO_3	ClO_4	TDS Measured	EC Measured	Ca	Mg	Na	K	HCO_3	SO_4	Cl	F	NO_3	ClO_4	Sum Cations	Sum Anions	(Cat-An)/ (Cat+An)	Acceptable Variance	TDS Sum	Lab/Sum Ratio	Acceptable Ratio
															20.04	12.16	22.99	39.10	61.02	48.03	35.50	19.00	61.91	99.50				<5%?			1.0 - 1.2
			(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(umhos/cm)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(meq/l)	(%)		(mg/l)	-	
AA-08	Shallow	7.2	454	208	657	32.9	163 Lab	1820	975	1.3	6.2	3.3 B D	3500	5840	22.7	17.1	28.6	0.841	2.67	37.9	27.5	0.068	0.10	0.033	69	68	0.7	PASS-LA	4255.50	0.82	FAIL-LA
AA-08 (FA)	Shallow	7.2	454	208	657	32.9	152 Field	1820	975	1.3	6.2	3.3 B D	3500	5840	22.7	17.1	28.6	0.841	2.49	37.9	27.5	0.068	0.10	0.033	69	68	0.8	PASS-FA	4248.90	0.82	FAIL-FA
AA-20	Shallow	6.9	556	235	898 J	44.2	78 J Lab	2540	1100	0.22	14.7	5.3 D	6400	7640 J	27.7	19.3	39.1	1.13	1.28	52.9	31.0	0.012	0.24	0.053	87	85	1.0	PASS-LA	5440.22	1.2	PASS-LA
AA-20 (FA)	Shallow	6.9	556	235	898 J	44.2	79 Field	2540	1100	0.22	14.7	5.3 D	6400	7640 J	27.7	19.3	39.1	1.13	1.29	52.9	31.0	0.012	0.24	0.053	87	85	1.0	PASS-FA	5440.82	1.2	PASS-FA
AA-27	Shallow Upgradient	7.6	513	192	535	8.58	126 Lab	2320	422	2	12.5	0.23 D	3300	4980	25.6	15.8	23.3	0.219	2.06	48.3	11.9	0.11	0.20	2.3E-03	65	63	1.8	PASS-LA	4080.91	0.81	FAIL-LA
AA-27 (FA)	Shallow Upgradient	7.6	513	192	535	8.58	122 Field	2320	422	2	12.5	0.23 D	3300	4980	25.6	15.8	23.3	0.219	2.00	48.3	11.9	0.11	0.20	2.3E-03	65	62	1.9	PASS-FA	4078.51	0.81	FAIL-FA
AA-UW-4	Shallow Upgradient	7.6	401	194	919	16	78 Lab	2920	304	0.81	12.6	0.077 D	4300	5700	20.0	16.0	40.0	0.409	1.28	60.8	8.56	0.043	0.20	7.7E-04	76	71	3.7	PASS-LA	4814.29	0.89	FAIL-LA
AA-UW-4 (FA)	Shallow Upgradient	7.6	401	194	919	16	71 Field	2920	304	0.81	12.6	0.077 D	4300	5700	20.0	16.0	40.0	0.409	1.16	60.8	8.56	0.043	0.20	7.7E-04	76	71	3.8	PASS-FA	4810.09	0.89	FAIL-FA
AA-UW-6	Shallow Upgradient	7.6	384	151	342	62.4	66 Lab	2240	201	0.57	8.8	0.05 D	3700	4280	19.2	12.4	14.9	1.60	1.08	46.6	5.66	0.030	0.14	5.0E-04	48	54	5.4	FAIL-LA	3429.42	1.1	PASS-LA
AA-UW-6 (FA)	Shallow Upgradient	7.6	384	151	342	62.4	75 Field	2240	201	0.57	8.8	0.05 D	3700	4280	19.2	12.4	14.9	1.60	1.23	46.6	5.66	0.030	0.14	5.0E-04	48	54	5.6	FAIL-FA	3434.82	1.1	PASS-FA
DBMW-3	Shallow	7.6	562	367 J	970 J	104 J	56.4 J Lab	3230	1410	0.24	15.4	7.6 D	6600	8350	28.0	30.2	42.2	2.66	0.924	67.2	39.7	0.013	0.25	0.076	103	108	2.4	PASS-LA	6700.08	0.99	FAIL-LA
DBMW-3 (FA)	Shallow	7.6	562	367 J	970 J	104 J	60 Field	3230	1410	0.24	15.4	7.6 D	6600	8350	28.0	30.2	42.2	2.66	0.983	67.2	39.7	0.013	0.25	0.076	103	108	2.5	PASS-FA	6702.24	0.98	FAIL-FA
DBMW-4	Shallow	7.5	631	237	681	84.8	90.8 J Lab	2610	952	0.092 B	27.7	4.1 D	4400	6590 J	31.5	19.5	29.6	2.17	1.49	54.3	26.8	4.8E-03	0.45	0.041	83	83	0.2	PASS-LA	5282.17	0.83	FAIL-LA
DBMW-4 (FA)	Shallow	7.5	631	237	681	84.8	84 Field	2610	952	0.092 B	27.7	4.1 D	4400	6590 J	31.5	19.5	29.6	2.17	1.38	54.3	26.8	4.8E-03	0.45	0.041	83	83	0.2	PASS-FA	5278.09	0.83	FAIL-FA
DBMW-7	Shallow	5.3	658	289	617	71.8	65.2 J Lab	2410	1430	U	42.7	3.1 D	6900	7510 J	32.8	23.8	26.8	1.84	1.07	50.2	40.3	0.0	0.69	0.031	85	92	3.9	PASS-LA	5560.72	1.2	FAIL-LA
DBMW-7 (FA)	Shallow	5.3	658	289	617	71.8	157 Field	2410	1430	U	42.7	3.1 D	6900	7510 J	32.8	23.8	26.8	1.84	2.57	50.2	40.3	0.0	0.69	0.031	85	94	4.7	PASS-FA	5615.80	1.2	FAIL-FA
MCF-05	Middle	7.7	470	15300	19500	13300	127 Lab	80900 J	30900	U	U	U	180000	105000	23.5	1.26E+03	848	340	2.08	1.68E+03	870	0.0	0.0	0.0	2470	2557	1.7	PASS-LA	160446.20	1.1	PASS-LA
MCF-05 (FA)	Middle	7.7	470	15300	19500	13300	127 Field	80900 J	30900	U	U	U	180000	105000	23.5	1.26E+03	848	340	2.08	1.68E+03	870	0.0	0.0	0.0	2470	2557	1.7	PASS-FA	160446.20	1.1	PASS-FA
MCF-06A-R	Deep	6.6	250	15800	37800 J	10800	90.4 J Lab	70700	62000	U	U	U	178000	137000 J	12.5	1.30E+03	1.64E+03	276	1.48	1.47E+03	1.75E+03	0.0	0.0	0.0	3232	3220	0.2	PASS-LA	197404.24	0.90	FAIL-LA
MCF-06A-R (FA)	Deep	6.6	250	15800	37800 J	10800	88 Field	70700	62000	U	U	U	178000	137000 J	12.5	1.30E+03	1.64E+03	276	1.44	1.47E+03	1.75E+03	0.0	0.0	0.0	3232	3220	0.2	PASS-FA	197402.80	0.90	FAIL-FA
MCF-16C	Shallow	7.4	601	600	602	308	83.6 J Lab	6290	1050	0.43 B	16.6	8.7 B D	11500	11200 J	30.0	49.3	26.2	7.88	1.37	131	29.6	0.023	0.27	0.087	113	162	17.7	FAIL-LA	9526.89	1.2	FAIL-LA
MCF-16C (FA)	Shallow	7.4	601	600	602	308	83 Field	6290	1050	0.43 B	16.6	8.7 B D	11500	11200 J	30.0	49.3	26.2	7.88	1.36	131	29.6	0.023	0.27	0.087	113	162	17.7	FAIL-FA	9526.53	1.2	FAIL-FA
MCF-18A	Deep	6.4	2670	2680	58900 J	7090	28 J Lab	3590	114000	U	U	0.0061 J D	163000	196000 J	133	220	2.56E+03	181	0.459	74.7	3.21E+03	0.0	0.0	6.1E-05	3097	3286	3.0	PASS-LA	188946.81	0.86	FAIL-LA
MCF-18A (FA)	Deep	6.4	2670	2680	58900 J	7090	34 Field	3590	114000	U	U	0.0061 J D	163000	196000 J	133	220	2.56E+03	181	0.557	74.7	3.21E+03	0.0	0.0	6.1E-05	3097	3287	3.0	PASS-FA	188950.41	0.86	FAIL-FA
MCF-20A	Deep	6.8	392	12200 J	29500 J	9470 J	90 J Lab	70100	61300	U	U	U	174000	3840	19.6	1.00E+03	1.28E+03	242	1.47	1.46E+03	1.73E+03	0.0	0.0	0.0	2548	3188	11.1	FAIL-LA	183016.00	0.95	FAIL-LA
MCF-20A (FA)	Deep	6.8	392	12200 J	29500 J	9470 J	69 Field	70100	61300	U	U	U	174000	3840	19.6	1.00E+03	1.28E+03	242	1.13	1.46E+03	1.73E+03	0.0	0.0	0.0	2548	3187	11.1	FAIL-FA	183003.40	0.95	FAIL-FA
POD2-R	Shallow	7.4	685	235	1080	27.7	103 J Lab	2560	1570	0.92	20.7	7.9 D	5500	8870 J	34.2	19.3	47.0	0.708	1.69	53.3	44.2	0.048	0.33	0.079	101	100	0.8	PASS-LA	6249.02	0.88	FAIL-LA
POD2-R (FA)	Shallow	7.4	685	235	1080	27.7	98 Field	2560	1570	0.92	20.7	7.9 D	5500	8870 J	34.2	19.3	47.0	0.708	1.61	53.3	44.2	0.048	0.33	0.079	101	100	0.8	PASS-FA	6246.02	0.88	FAIL-FA

Total Samples:	28		28
Passing:	22		6
Failing:	6		22
Total Lab Alkalinity:	14		14
Passing Lab Alkalinity	11		3
Failing Lab Alkalinity	3		11
% Passing:	78.6		21.4
Total Field Alkalinity:	14		14
Passing Field Alkalinity	11		3
Failing Field Alkalinity:	3		11
% Passing:	78.6		21.4

Summary of Cation-Anion Balance and Related Calculations
2009 Groundwater Sampling Event - BMI Common Areas - Eastside

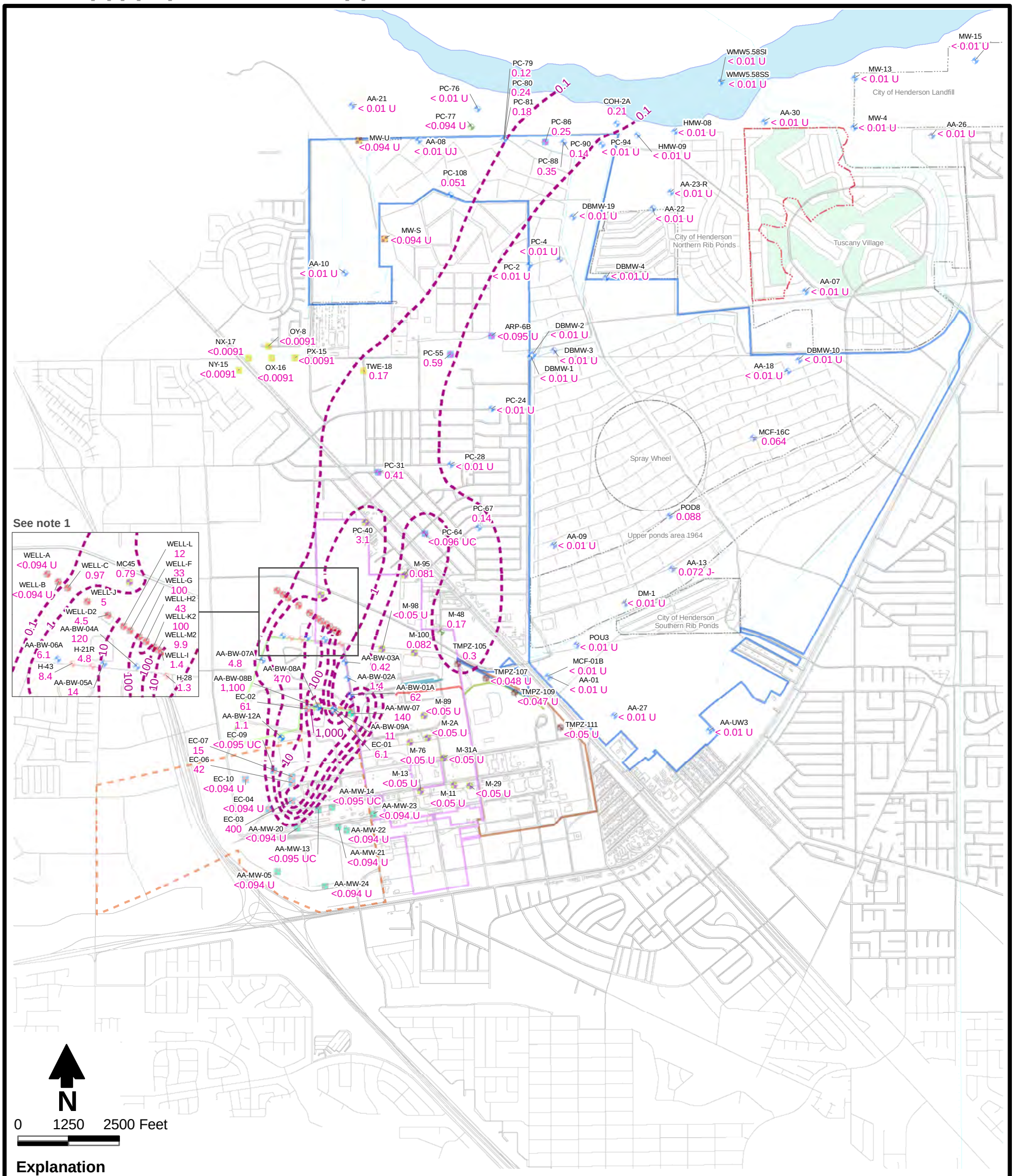
Notes:
NR - not reported
mg/L - Milligrams per Liter
(1) For samples with anion sum > 800 meq/L, see Table 1b for Cation-Anion Balance Results
(2) No temperature values available for MCF-06A-R and MCF-20A due to equipment malfunction. A value of 26.6˚ C used in density calculation, taken from average of other wells in table
(3) For the CAB test, a 5% variance is acceptable for samples with an anion sum 10-800 meq/L, and a 2% variance is acceptable for samples with an anion sum of 3-10 meq/L
Density calculated from http://www.earthwardconsulting.com/density_calculator.htm
Well PC-90 was removed since no value for EC was reported.

Qualifiers:
J-TDS: TDS measured/sum and/or TDS:EC ratio checks do not pass; Cation-anion balance check does pass
R-CAB&TDS: Cation-anion balance check does not pass; TDS measured/sum and/or TDS:EC ratio check do not pass

Appendix G

Isoconcentration Plots
2009 Sampling Event

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/ALPHA_BHC_LAYER1.MXD 013050



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Stauffer - 2009
- Stauffer - 2008
- TIMET - 2008
- Tronox - 2006
- Tronox - 2008

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-48 0.17 Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

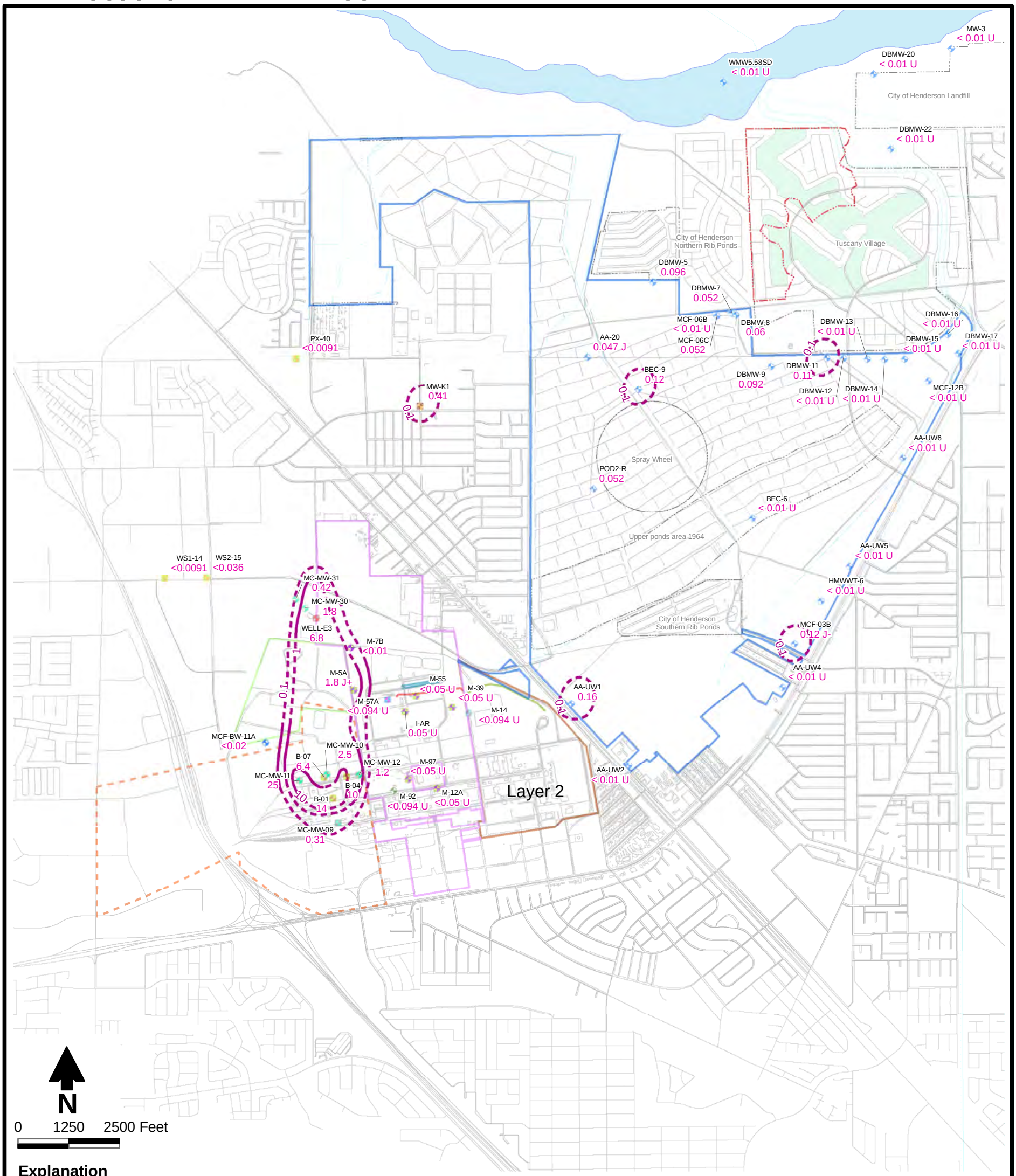
FIGURE G-1
Alpha BHC
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-03-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/ALPHA_BHC_LAYER1.MXD 019040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/ALPHA_BHC_LAYER2.MXD 013050



Explanation

Well Site - Date of Data

- Site not known - 2008
- AMPAC - 2004
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM Companies - 2008
- Olin - 2008
- Tronox - 2006
- Tronox - 2008
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)

M-10
620
Monitoring well designation
Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-2
Alpha BHC
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

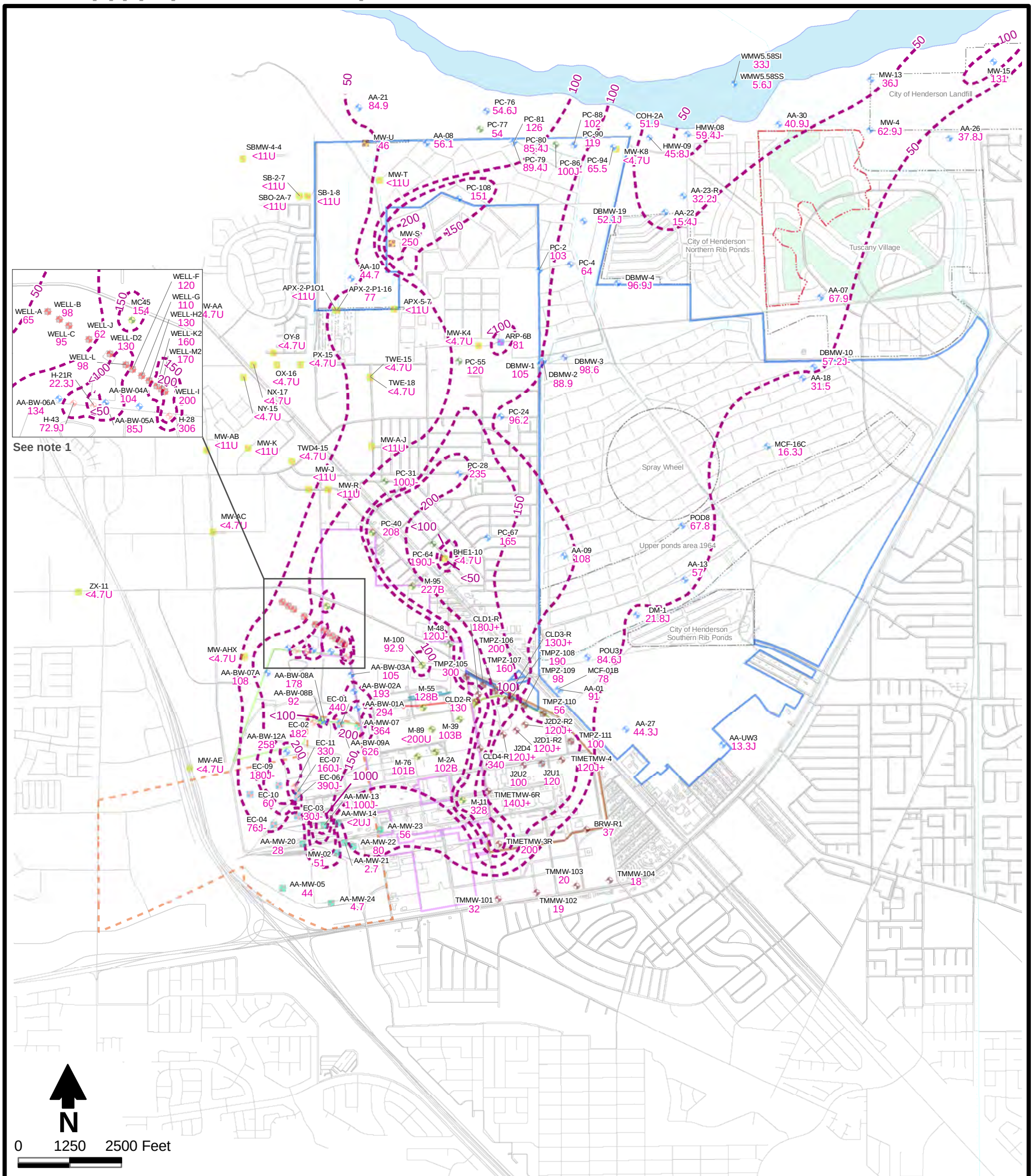
Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 05-03-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/ALPHA_BHC_LAYER2.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/ARSENIC_LAYER1.MXD 011150



Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System.
2. Data from 2004 not used for contouring.

BMI Common Areas (Eastside)
Henderson, Nevada

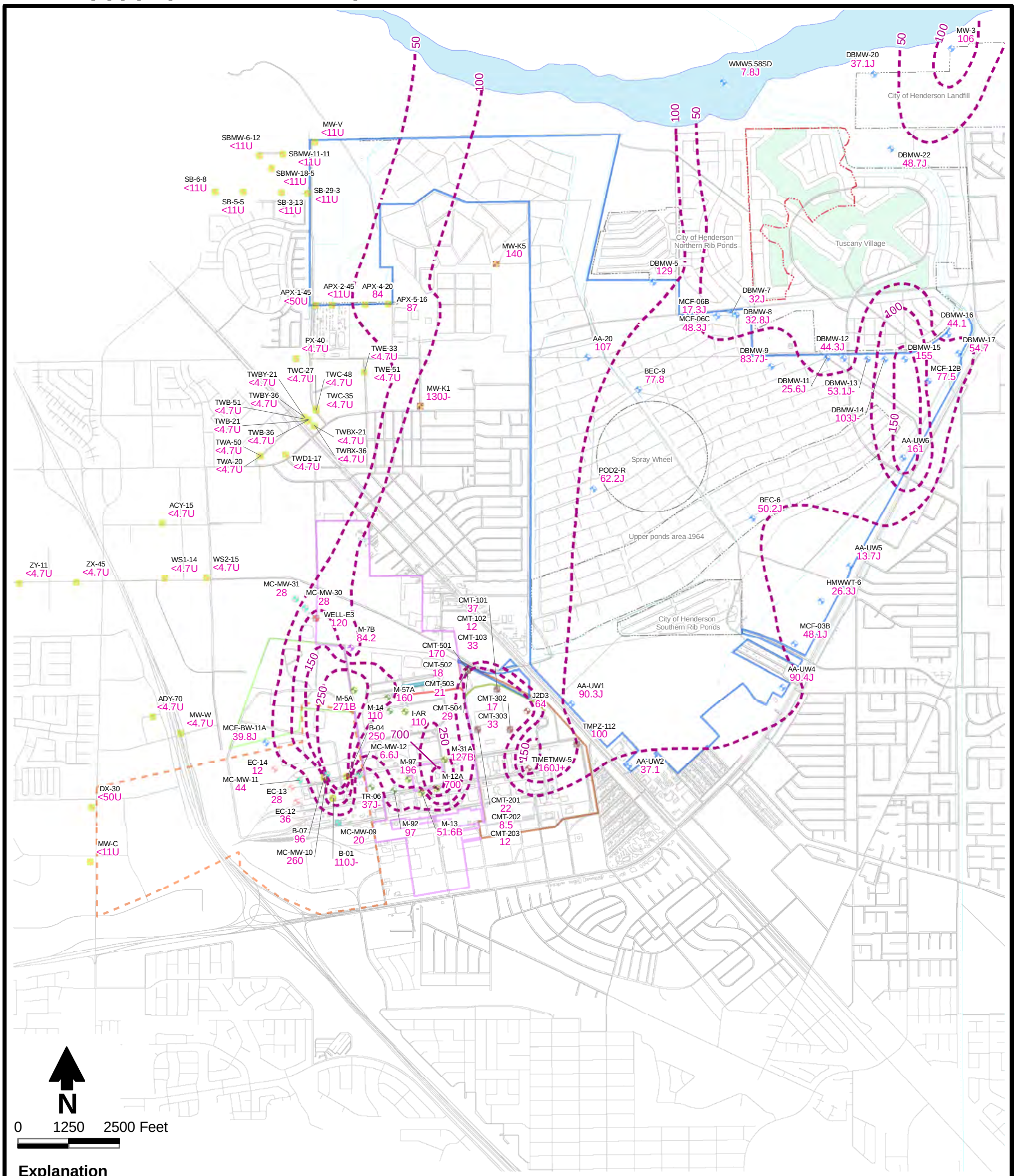
FIGURE G-3
Arsenic
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A AFM
Date 05-11-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/Arsenic_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/ARSENIC_LAYER2.MXD 011150



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2009
- Kerr-McGee - 2007
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Olin - 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- TRONOX - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-10 620 Monitoring well designation Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-4
Arsenic
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

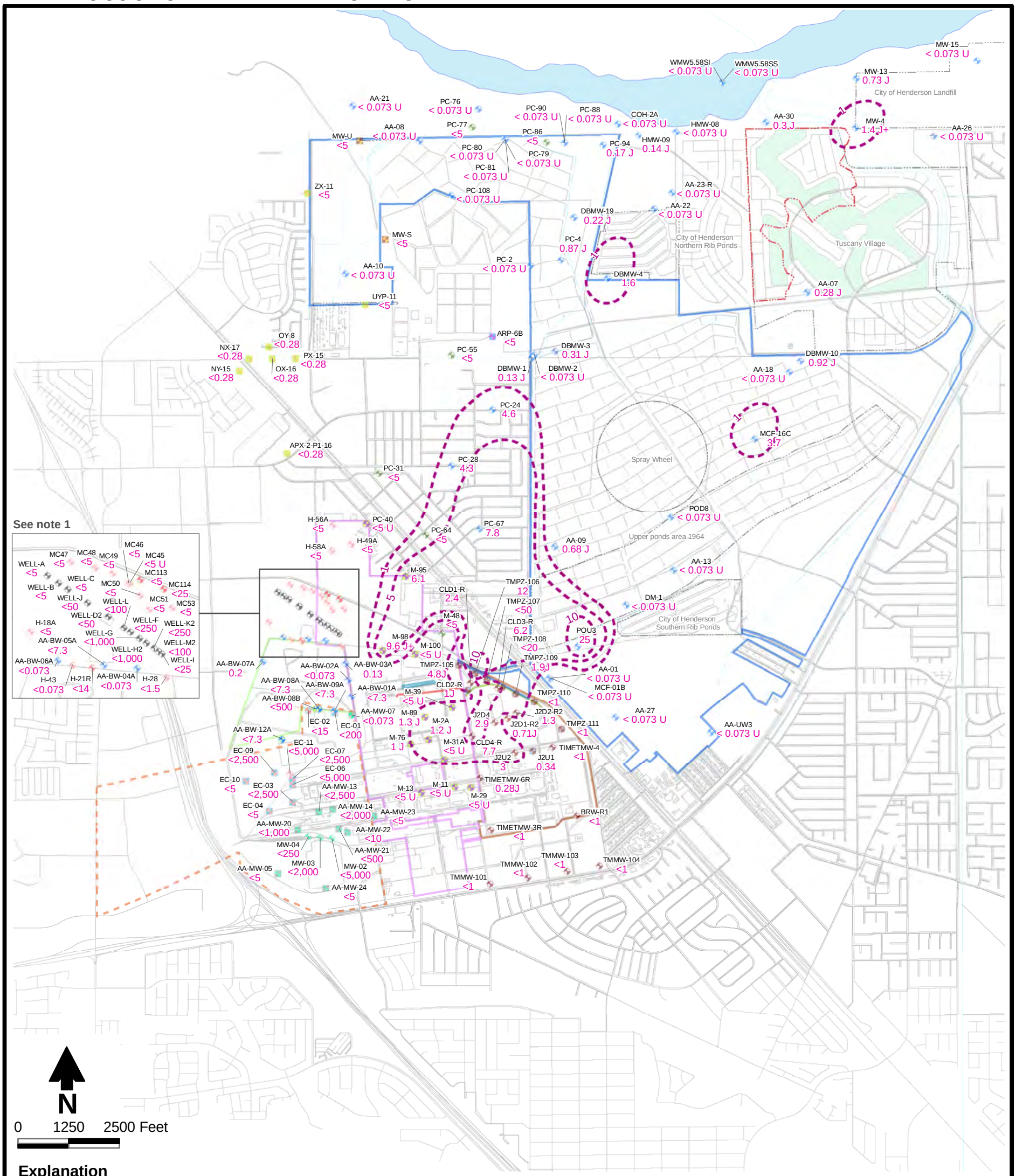
Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 05-11-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/ARSENIC_LAYER2.MXD 016240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CARBON_TETRACHLORIDE_LAYER1.MXD 017050



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2009
- POSSOM - 2008
- Stauffer - 2006
- Stauffer - 2008
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2008
- TIMET - 2009
- Tronox - 2006
- Tronox - 2008

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- BRW-R1 43 Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

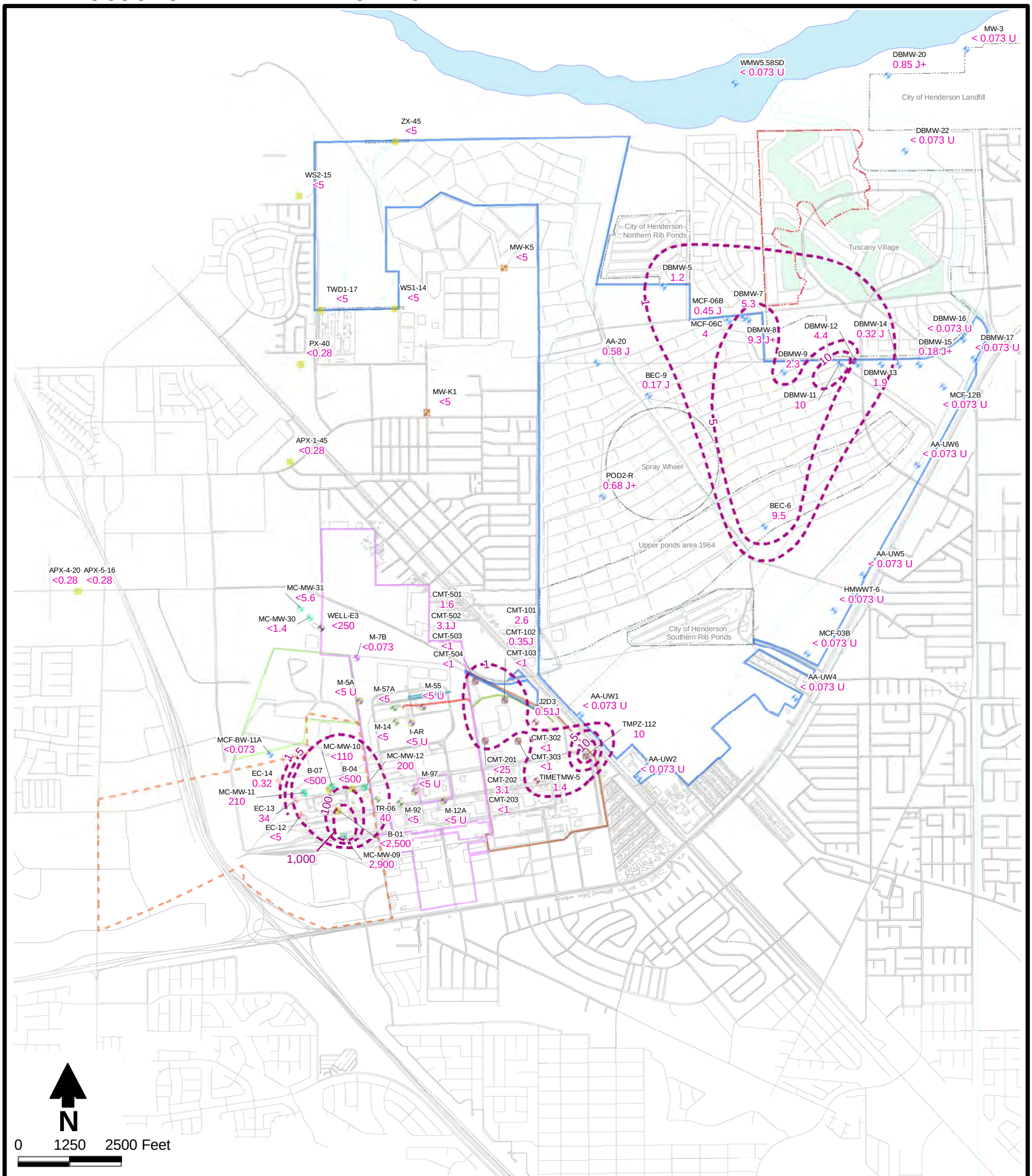
FIGURE G-5
Carbon Tetrachloride
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-03-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/carbon_tetrachloride_layer1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CARBON_TETRACHLORIDE_LAYER2.MXD 017050



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- Olin - 2008
- POSSOM - 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2006
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-10 620 — Monitoring well designation Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

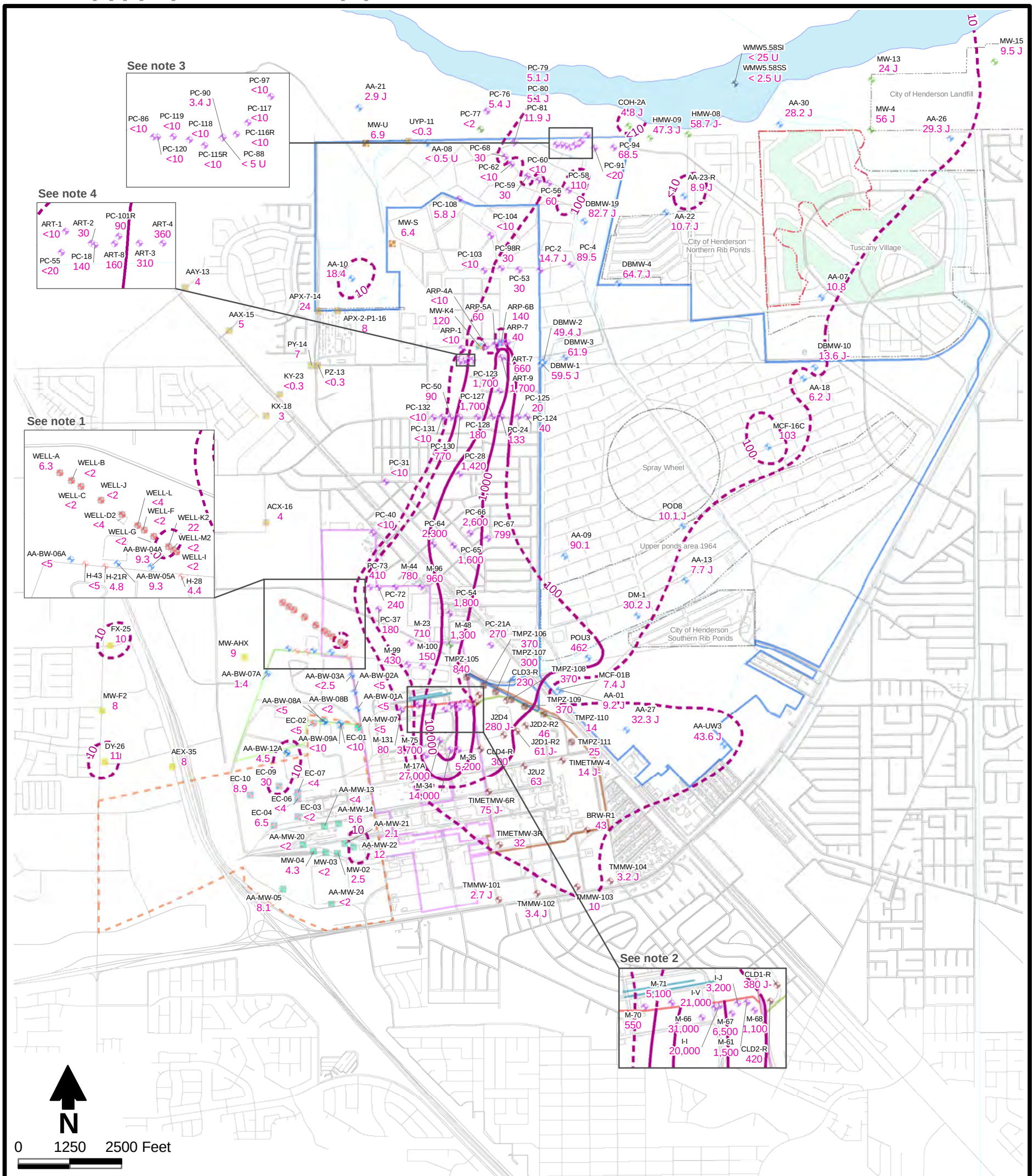
FIGURE G-6
Carbon Tetrachloride
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-03-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/carbon_tetrachloride_LAYER2.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CR_TOTAL_LAYER1.MXD 018240



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2005
- AMPAC - 2008
- AMPAC - 2009
- BRC - 2008
- BRC - 2009
- U.S. Bureau of Reclamation - 2009
- City of Henderson, Nevada - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Stauffer - 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2008
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- BRW-R1 43 — Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System
2. Tronox Source Area Groundwater Extraction/Treatment/Re-injection System
3. Tronox Seep Area Groundwater Extraction System
4. Tronox Athens Road Area Groundwater Extraction System

BMI Common Areas (Eastside)
Henderson, Nevada

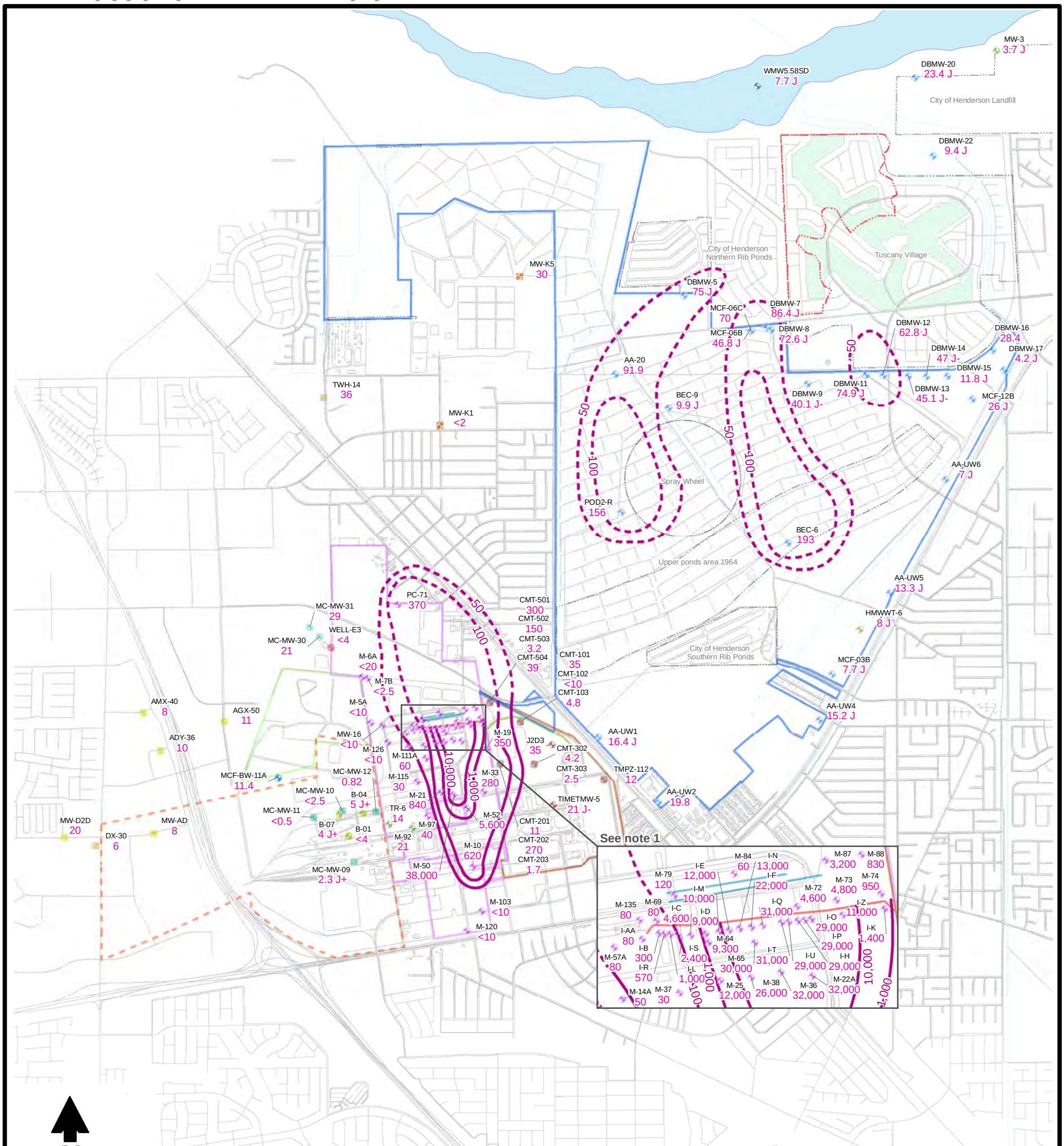
FIGURE G-7
Total Chromium
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A CRS
Date 04-28-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/total_cr_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CR_TOTAL_LAYER2.MXD 016140



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2005
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- U.S. Bureau of Reclamation - 2009
- City of Henderson, Nevada - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Olin - 2008
- TIMET - 2008
- TIMET - 2009
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-10 620 — Monitoring well designation Result (ug/L)

Notes:
1. Tronox Source Area Groundwater Extraction/Treatment/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

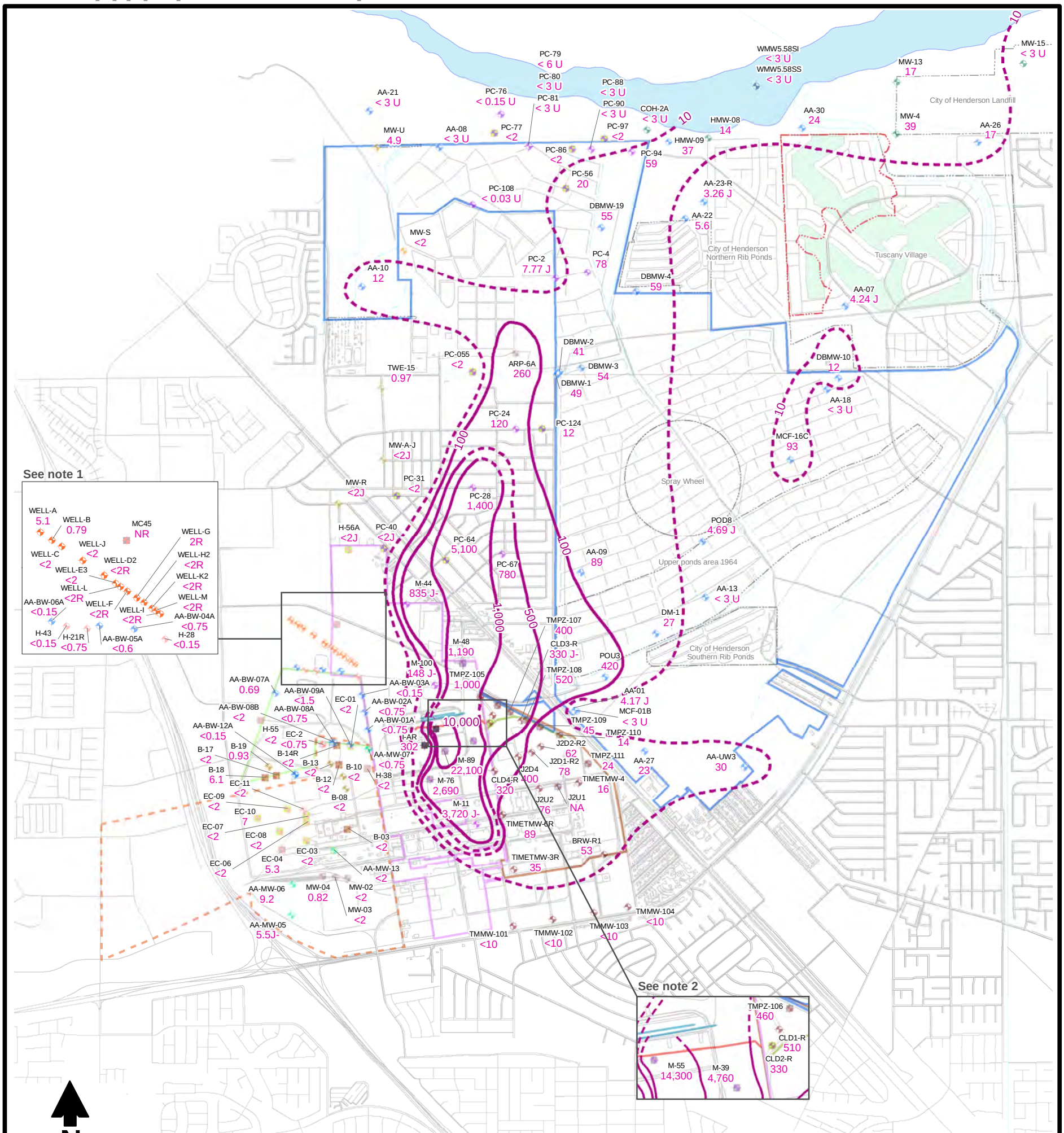
FIGURE G-8
Total Chromuim
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A CRS
Date 04-21-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/total_cr_LAYER2.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CRVI_LAYER1.MXD 019240



Explanation

Well Site - Date of Data

- Site not known - 2006
- Site not known - 2009
- AMPAC - 2006
- BRC - 2006
- BRC - 2009
- U.S. Bureau of Reclamation - 2009
- City of Henderson, Nevada - 2009
- Montrose - 2006
- Montrose - 2007
- Montrose - 2009
- OSM - 2006
- Olin - 2006
- Olin - 2007
- Stauffer - 2006
- Stauffer - 2007
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2007
- TIMET - 2008
- TIMET - 2009
- Tronox - 2006
- Tronox - 2007
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- AA-01 4.17 J — Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System
2. Tronox Source Area Groundwater Extraction/Treatment/Re-injection System
3. NA = Not analyzed
4. No Cr(VI) data available for AMPAC

BMI Common Areas (Eastside)
Henderson, Nevada

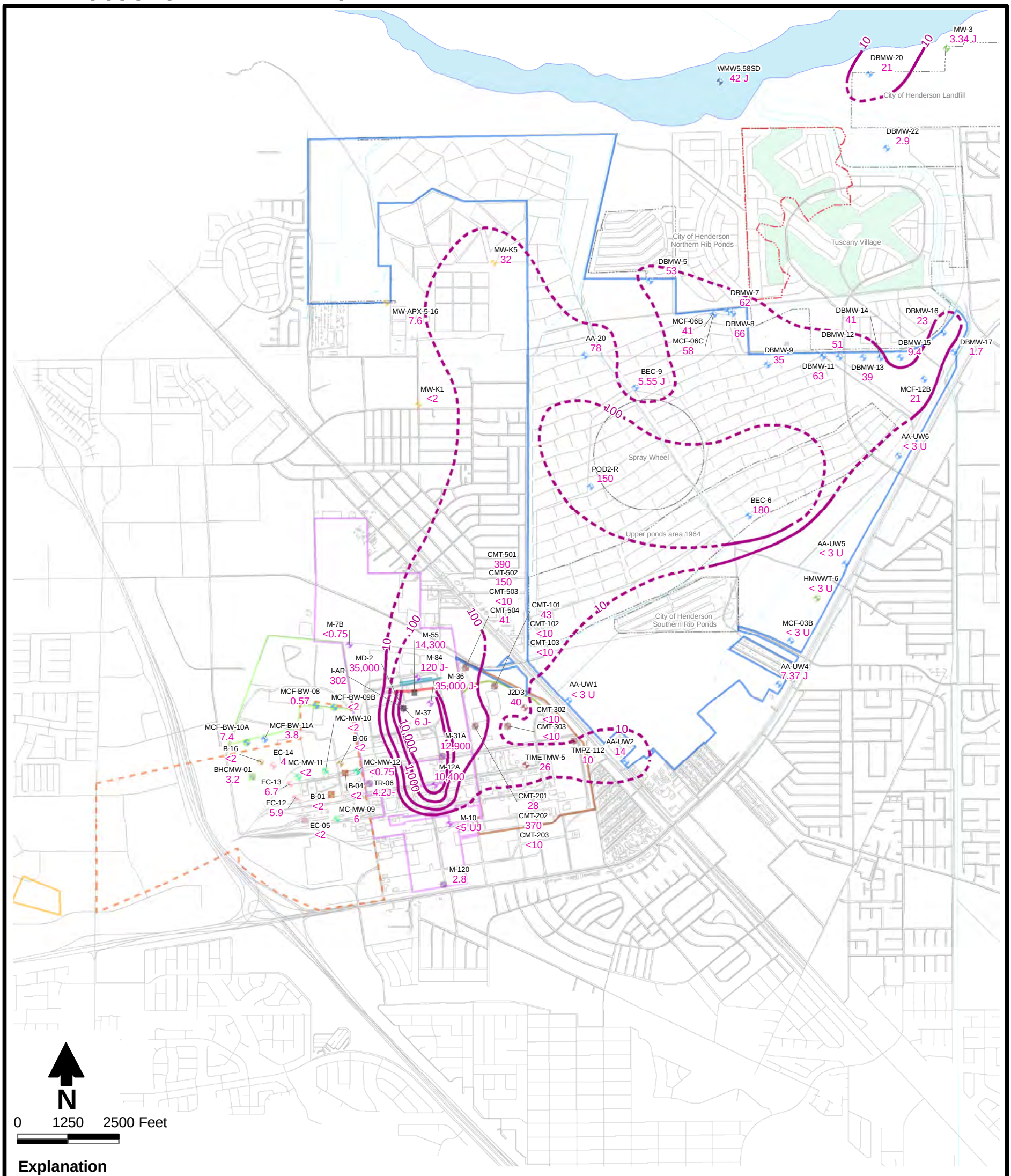
FIGURE G-9
Hexavalent Chromium (Cr(VI))
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A CRS
Date 04-29-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/total_cr_LAYER1_VER2.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/CRVI_LAYER2.MXD 019240



Explanation

Well Site - Date of Data

- Site not known - 2007
- Site not known - 2009
- AMPAC - 2006
- BRC - 2007
- BRC - 2009
- U.S. Bureau of Reclamation - 2009
- City of Henderson, Nevada - 2009
- Montrose - 2006
- Montrose - 2007
- Montrose - 2009
- Olin - 2006
- Olin - 2007
- Stauffer - 2007
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2007
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-120 2.8 Monitoring well designation Result (ug/L)

Notes:
1. No Cr(VI) data available for AMPAC

BMI Common Areas (Eastside)
Henderson, Nevada

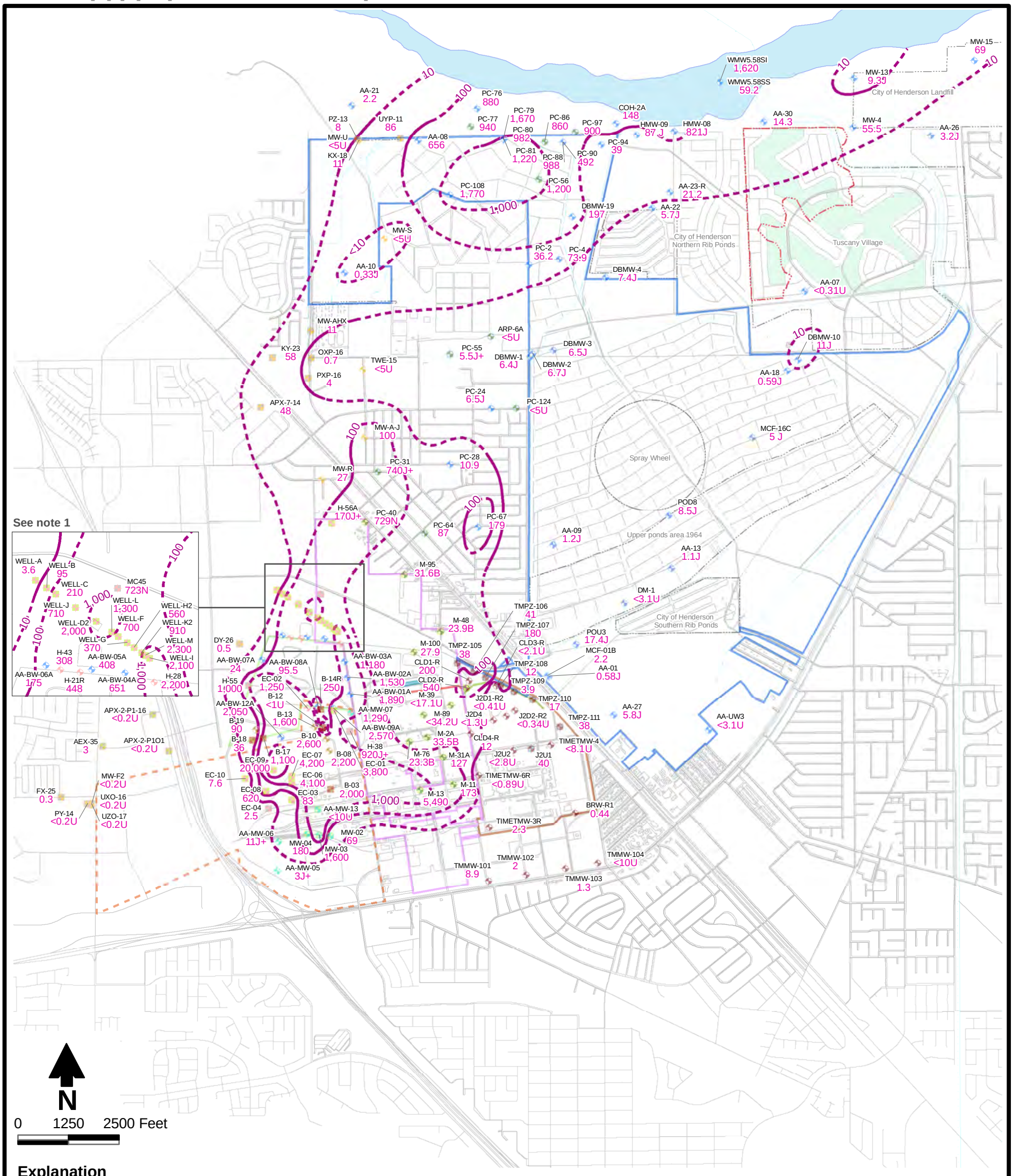
FIGURE G-10
Hexavalent Chromium (Cr(VI))
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A CRS
Date 04-29-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/total_cr_LAYER2.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/MANGANESE_LAYER1.MXD 017050



Explanation

Well	Site - Date of Data
	AMPAC - 2005
	AMPAC - 2006
	BRC- 2009
	Kerr-McGee - 2006
	Kerr-McGee - 2007
	Montrose - 2006
	Montrose - 2007
	Montrose - 2009
	Olin - 2006
	Olin - 2007
	Stauffer - 2006
	Stauffer - 2007
	Stauffer - 2009
	TIMET - 2006
	TIMET - 2007
	TIMET - 2008
	TIMET - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- EC-04 2.5 — Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

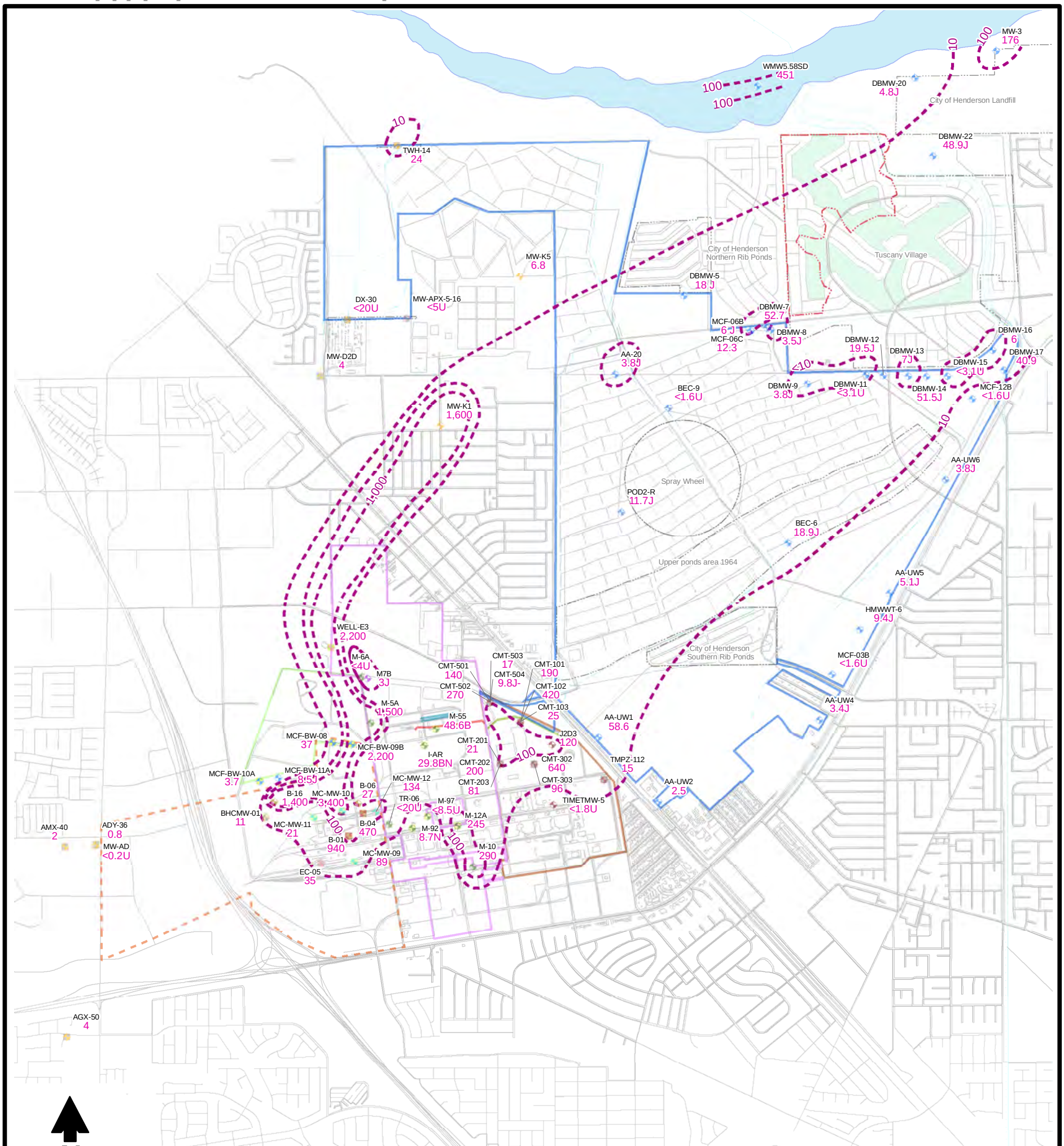
FIGURE G-11
Manganese
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-06-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/MANGANESE_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/MANGANESE_LAYER2.MXD 017050



Explanation

Well Site - Date of Data

- Site not known - 2006
- Site not known - 2007
- AMPAC - 2005
- AMPAC - 2006
- BRC - 2007
- BRC - 2009
- Kerr-McGee - 2007
- Kerr-McGee - 2009
- Montrose - 2006
- Montrose - 2009
- Olin - 2006
- Olin - 2007
- Stauffer - 2006
- Stauffer - 2007
- TIMET - 2008
- TIMET - 2009
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-10 290 — Monitoring well designation Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-12
Manganese
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

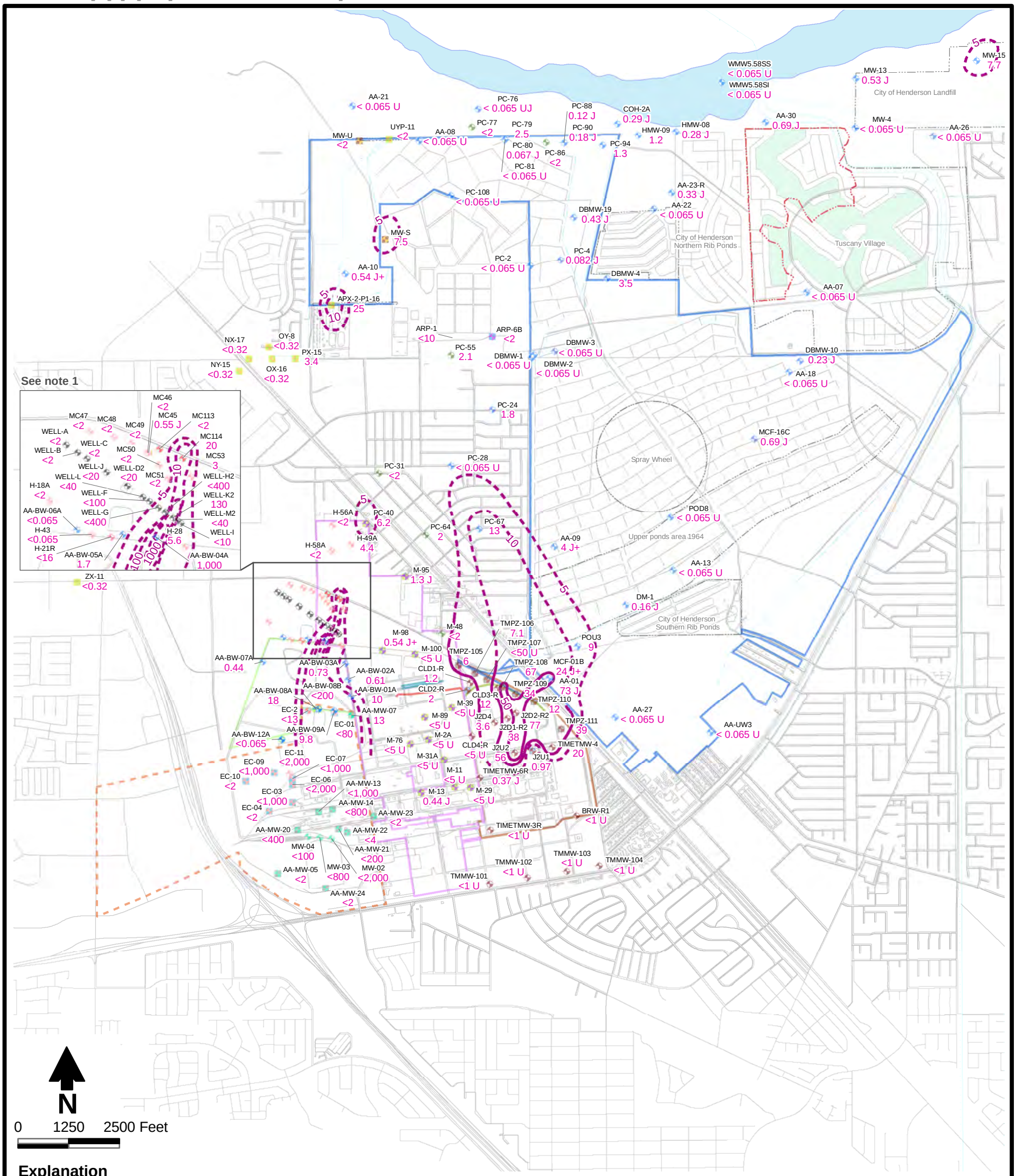
Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 05-06-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/MANGANESE_LAYER2.MXD 018240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/PCE_LAYER1.MXD 010340



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2009
- POSSOM - 2008
- Stauffer - 2006
- Stauffer - 2008
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2008
- TIMET - 2009
- Tronox - 2006
- Tronox - 2008

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- BRW-R1 / 43 — Monitoring well designation / Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

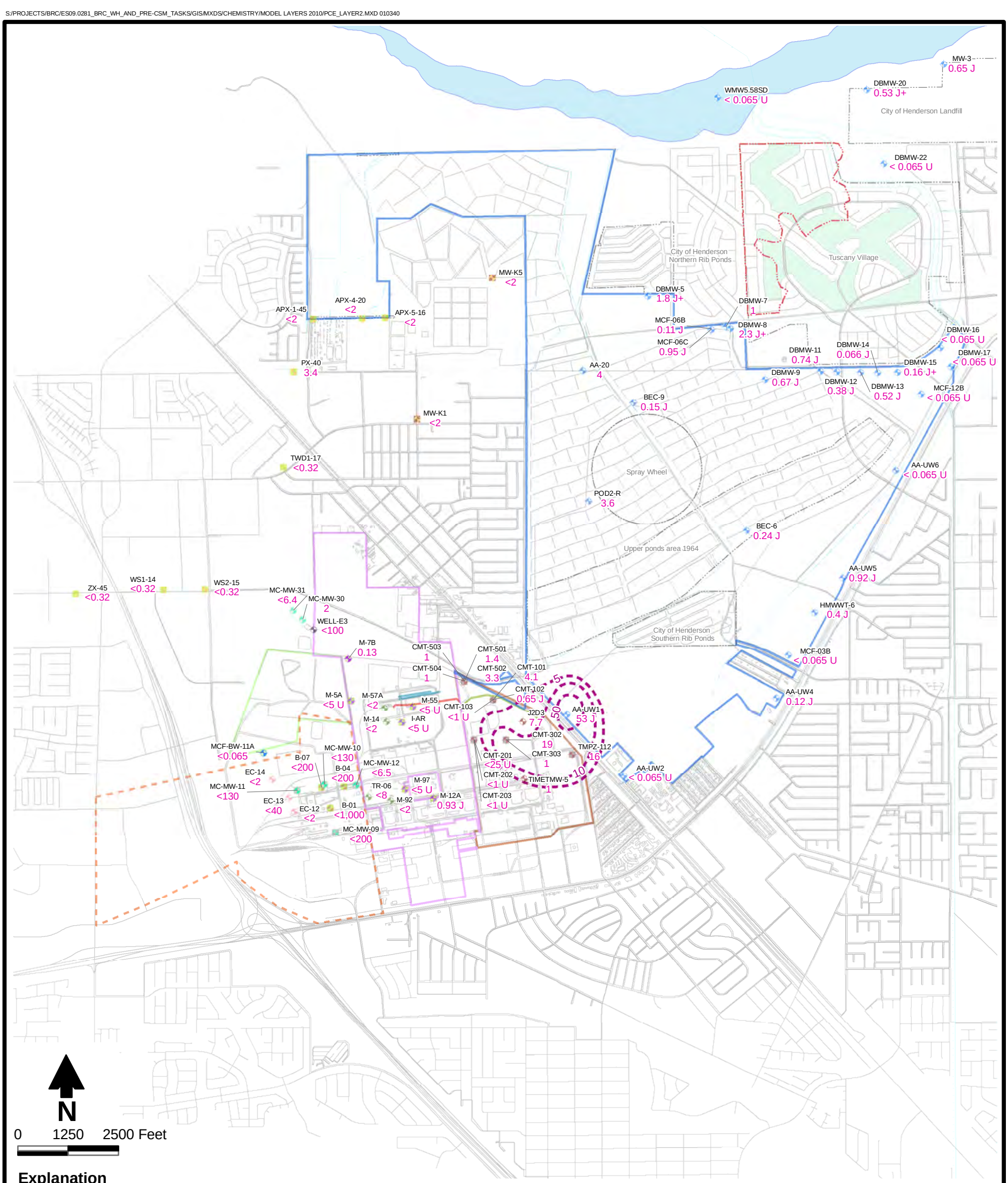
FIGURE G-13
PCE
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A AFM
Date 04-30-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/PCE_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/PCE_LAYER2.MXD 010340



Explanation

Well Site - Date of Data

- AMPAC - 2004
- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- Olin - 2008
- POSSOM - 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2006
- Tronox- 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- TMPZ-112 16 Monitoring well designation Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-14
PCE
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

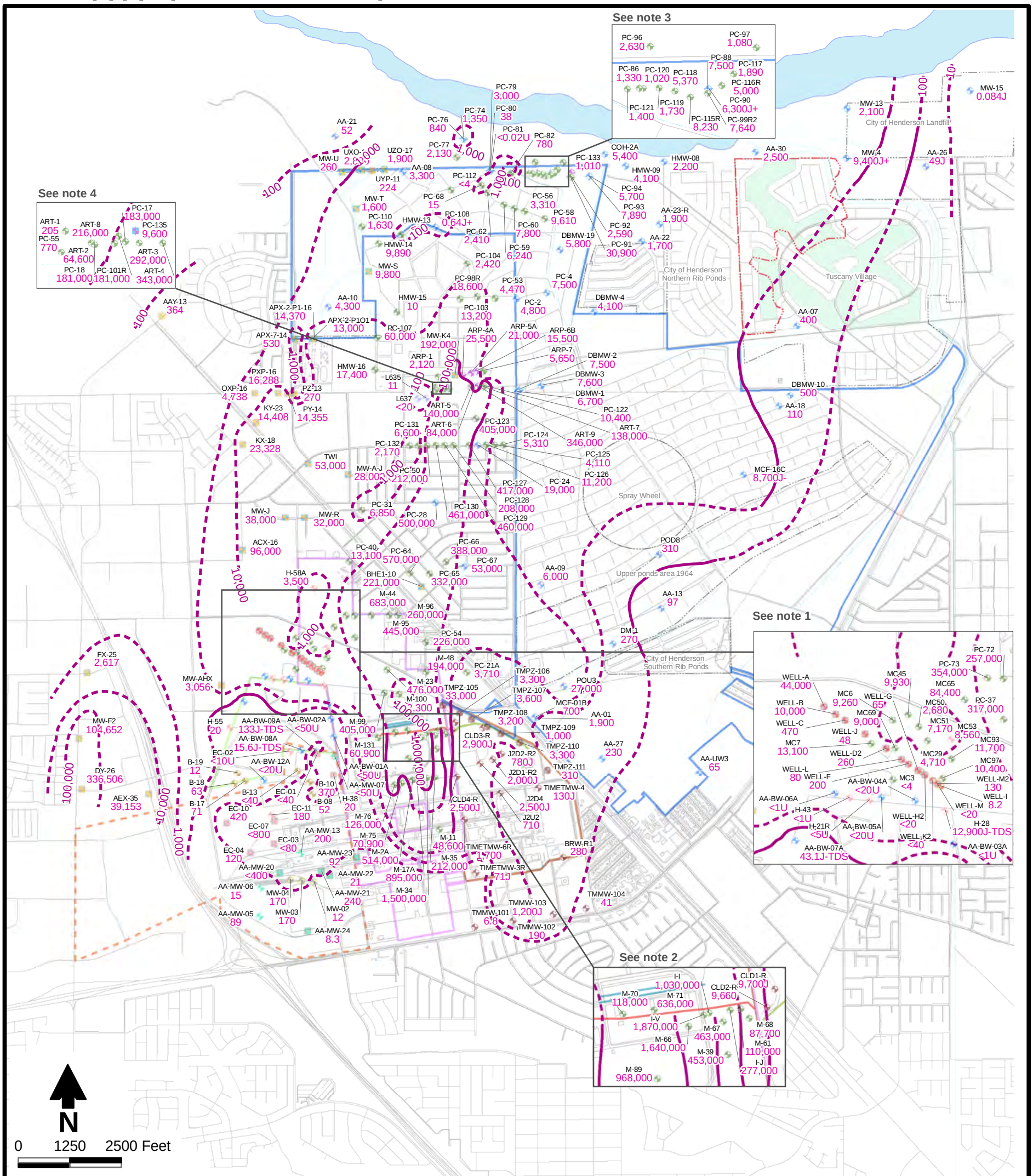
Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 04-30-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/PCE_LAYER2.MXD 010240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/PERCHLORATE_LAYER1.MXD 010340



Well Site - Date of Data

- Site not known - 2006
- Site not known - 2007
- AMPAC - 2005
- AMPAC - 2007
- AMPAC - 2009
- BRC - 2009
- Kerr-McGee - 2009
- Montrose - 2007
- Montrose - 2008
- Montrose - 2009
- OSM - 2007
- OSM - 2008
- Olin - 2007
- Stauffer - 2007
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2008
- TIMET - 2009
- Tronox - 2008
- Tronox - 2009
- USEPA - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- BRW-R1 43 Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System
2. Tronox Source Area Groundwater Extraction/Treatment/Re-injection System
3. Tronox Seep Area Groundwater Extraction System
4. Tronox Athens Road Area Groundwater Extraction System

BMI Common Areas (Eastside)
Henderson, Nevada

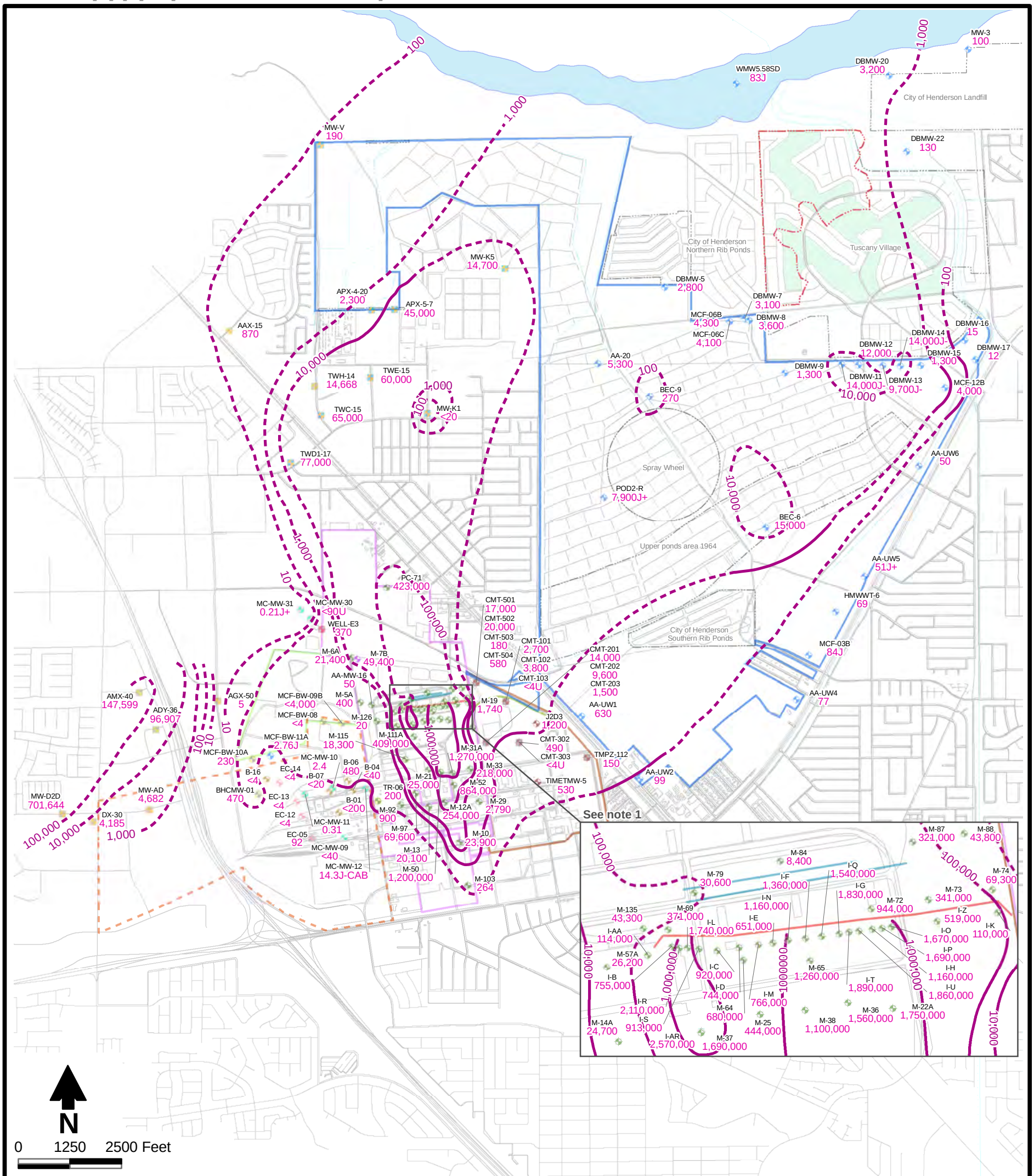
FIGURE G-15
Perchlorate
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A BGT
Date 04-30-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/Perchlorate_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/PERCHLORATE_LAYER2.MXD 010340



Explanation

Well Site - Date of Data

- Site not known - 2007
- Site not known - 2009
- AMPAC - 2005
- AMPAC - 2007
- AMPAC - 2009
- BRC - 2009
- Kerr-McGee - 2007
- Kerr-McGee - 2009
- Montrose - 2007
- Montrose - 2009
- OSM - 2008
- Olin - 2007
- Stauffer - 2007
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- M-103 264 Monitoring well designation Result (ug/L)

Notes:
1. Tronox Source Area Groundwater Extraction/Treatment/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

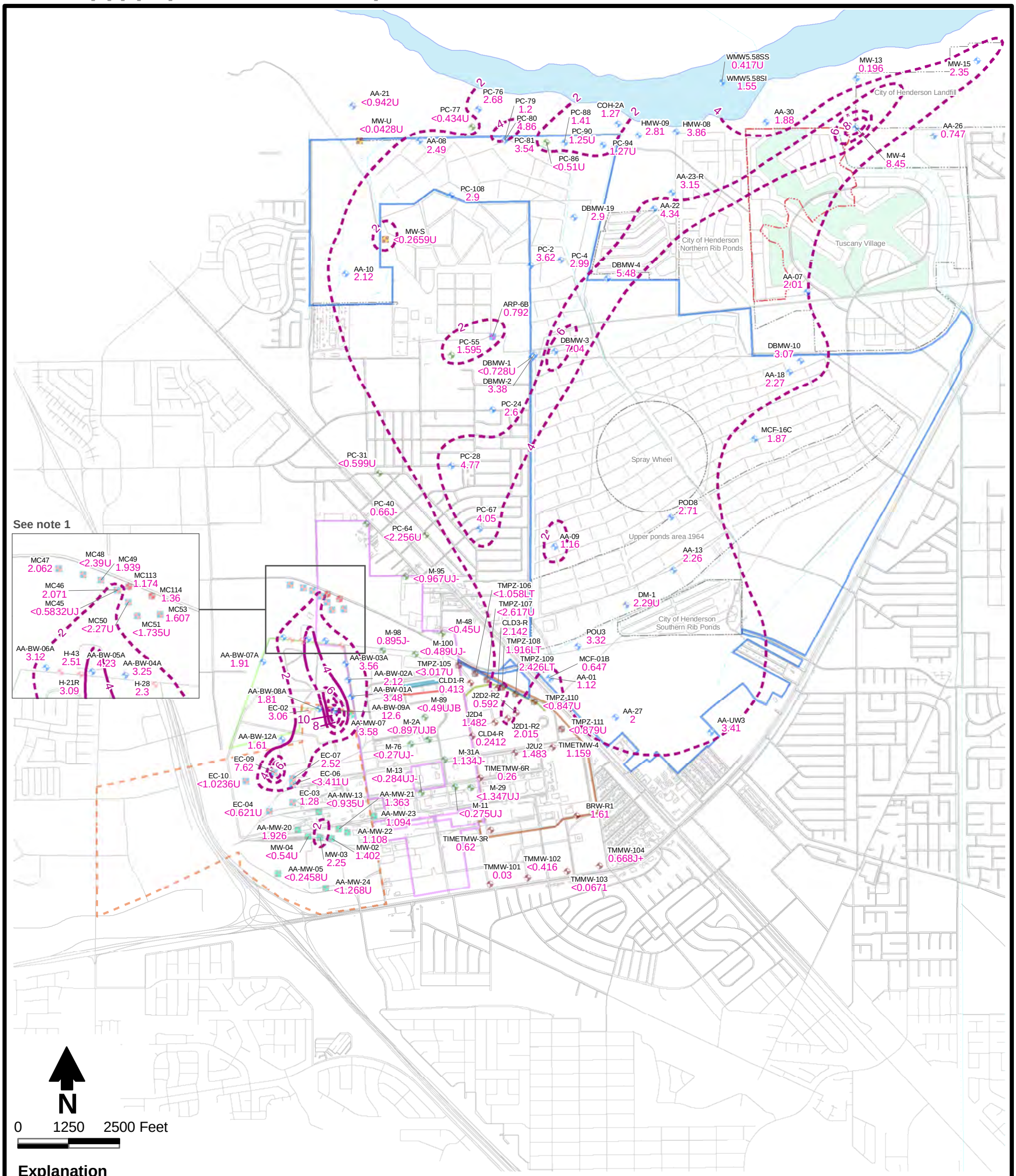
FIGURE G-16
Perchlorate
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A AFM
Date 04-3010

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/PERCHLORATE_LAYER2.MXD 012240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/RADIUM226+228_LAYER1.MXD 014050



Explanation

Well Site - Date of Data

- AMPAC - 2008
- BRC - 2009
- Kerr-McGee - 2006
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Stauffer - 2006
- Stauffer - 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2008

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- EC-07 2.52 Monitoring well designation Result (pCi/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

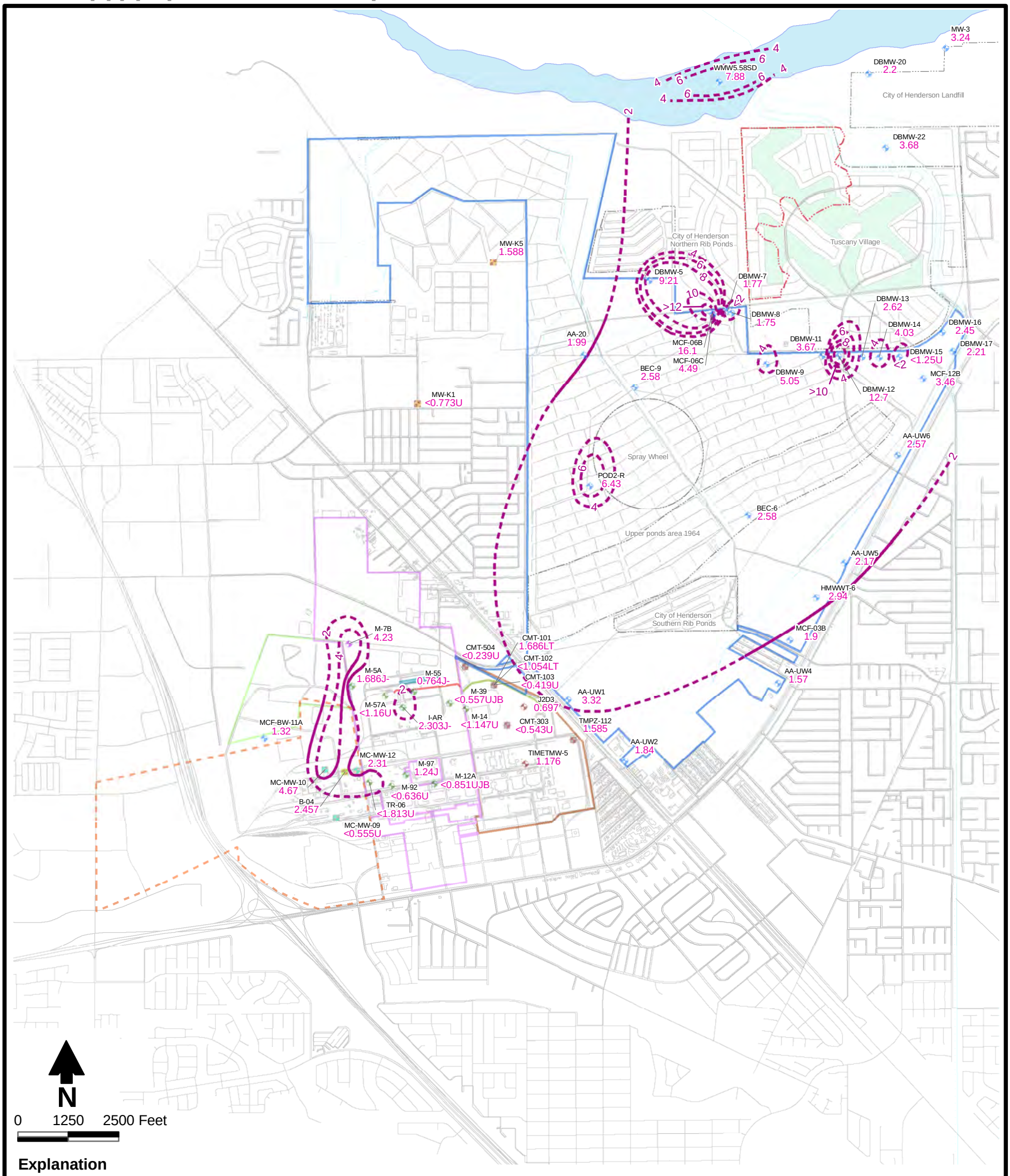
FIGURE G-17
Radium 226+228
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-04-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/RADIUM226+228_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/RADIUM226+228_LAYER2.MXD 014050



Explanation

Well Site - Date of Data

- AMPAC - 2008
- BRC - 2009
- Kerr-McGee - 2006
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- Olin - 2008
- TIMET - 2008
- TIMET - 2009
- TRONOX - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)

M-10
620
Monitoring well designation
Result (pCi/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-18
Radium 226+228
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

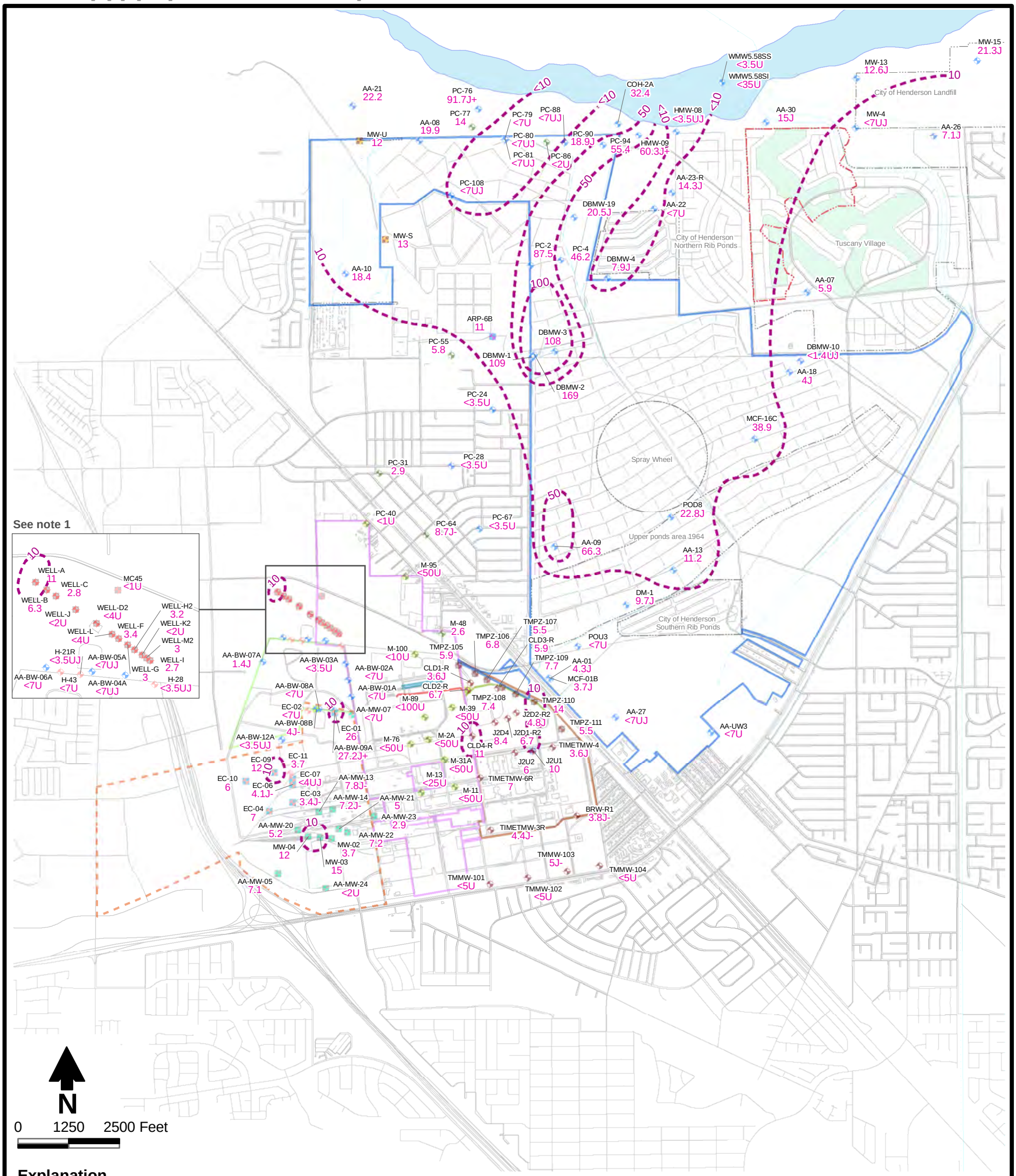
Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 05-04-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/RADIUM226+228_LAYER2.MXD 016240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/SELENIUM_LAYER1.MXD 017050



Explanation

Well Site - Date of Data

- AMPAC - 2008
- BRC - 2008
- BRC - 2009
- Kerr-McGee - 2007
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Stauffer - 2007
- Stauffer - 2008
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2007
- TIMET - 2008
- TIMET - 2009
- Tronox - 2008

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- MW-02 3.7 Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

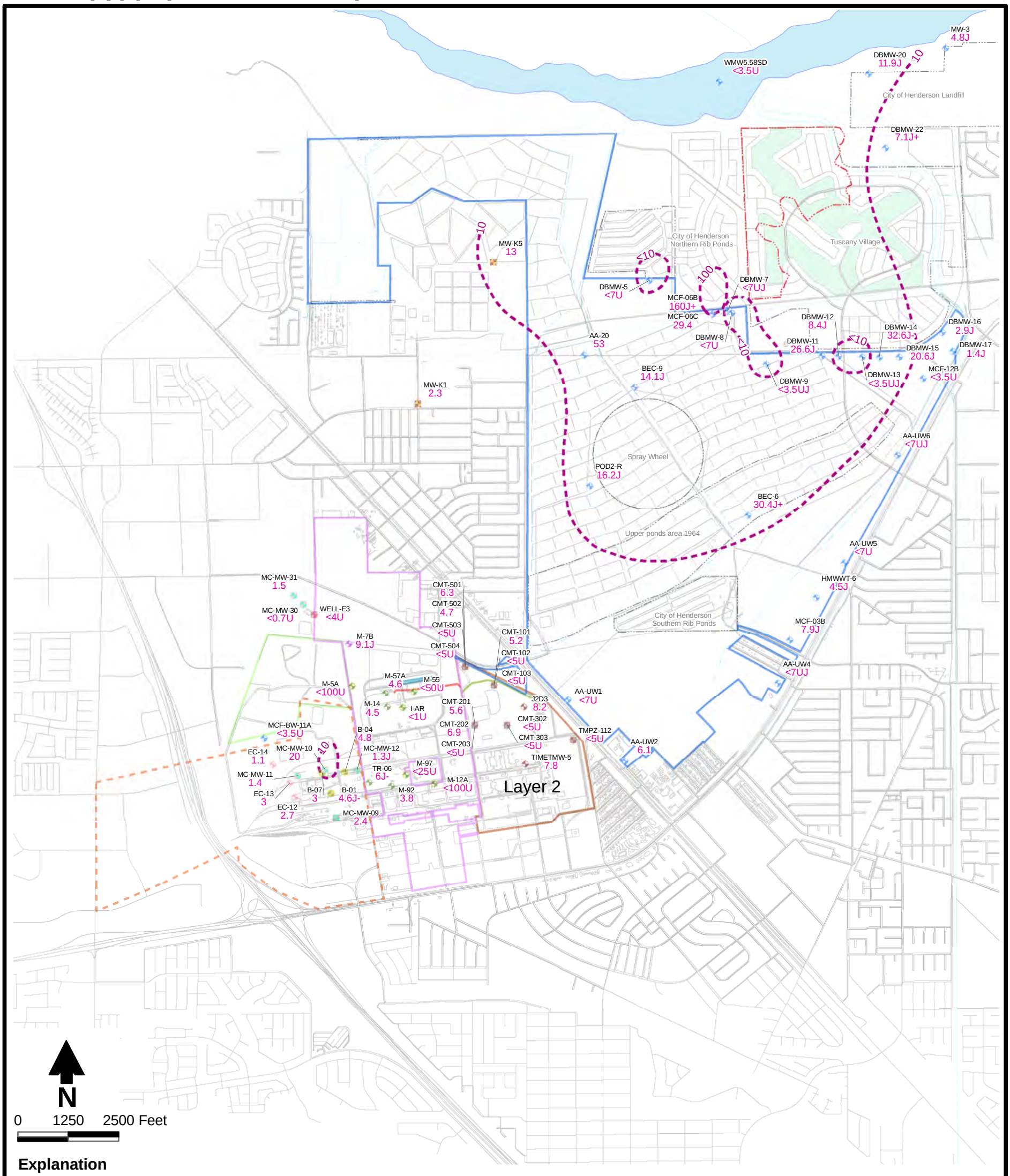
FIGURE G-19
Selenium
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-06-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/SELENIUM_LAYER1.MXD 016040

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/SELENIUM_LAYER2.MXD 017050



Explanation

Well Site - Date of Data

- AMPAC - 2008
- BRC - 2009
- Kerr-McGee - 2007
- Kerr-McGee - 2008
- Montrose - 2008
- Montrose - 2009
- OSM - 2008
- Olin, 2008
- Stauffer - 2009
- TIMET - 2008
- TIMET - 2009
- Tronox - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- EC-13 / 3 — Monitoring well designation / Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

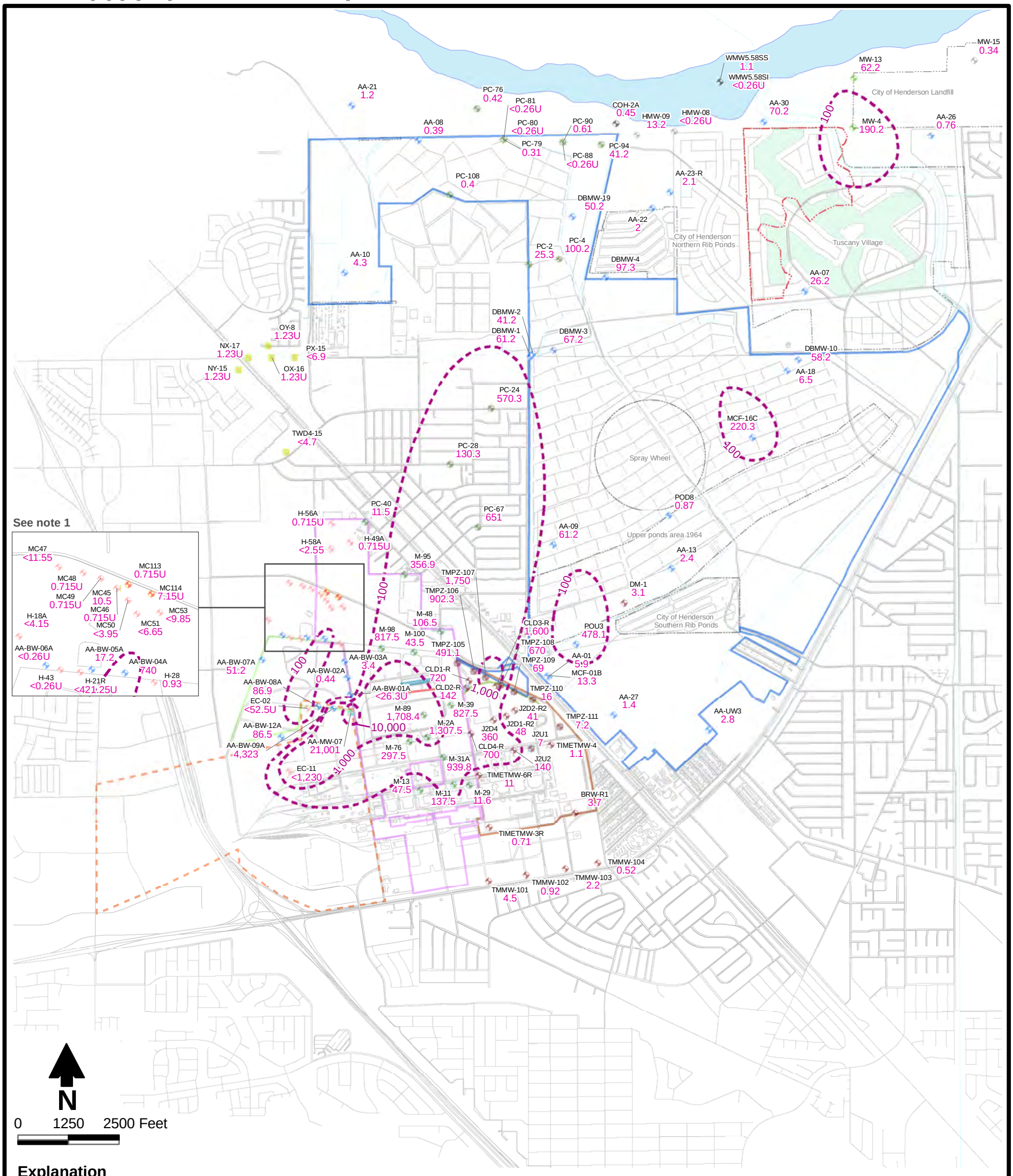
FIGURE G-20
Selenium
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.
Basic Remediation Company

Prepared by: DBS&A AFM
Date 05-06-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/SELENIUM_LAYER2.MXD 016240

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/TTHMS_LAYER1.MXD 012//5



Explanation

Well Site - Date of Data

- Site not known - 2009
- AMPAC - 2004
- BRC - 2009
- City of Henderson - 2009
- Kerr-McGee - 2006
- Kerr-McGee - 2009
- Montrose - 2009
- OSM - 2009
- SNWA - 2009
- Stauffer - 2006
- Stauffer - 2009
- TIMET, 2006
- TIMET - 2008
- TIMET - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash
- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)
- MW-02 3.7 Monitoring well designation Result (ug/L)

Notes:
1. POSSM Groundwater Extraction/Air Stripping/Re-injection System

BMI Common Areas (Eastside)
Henderson, Nevada

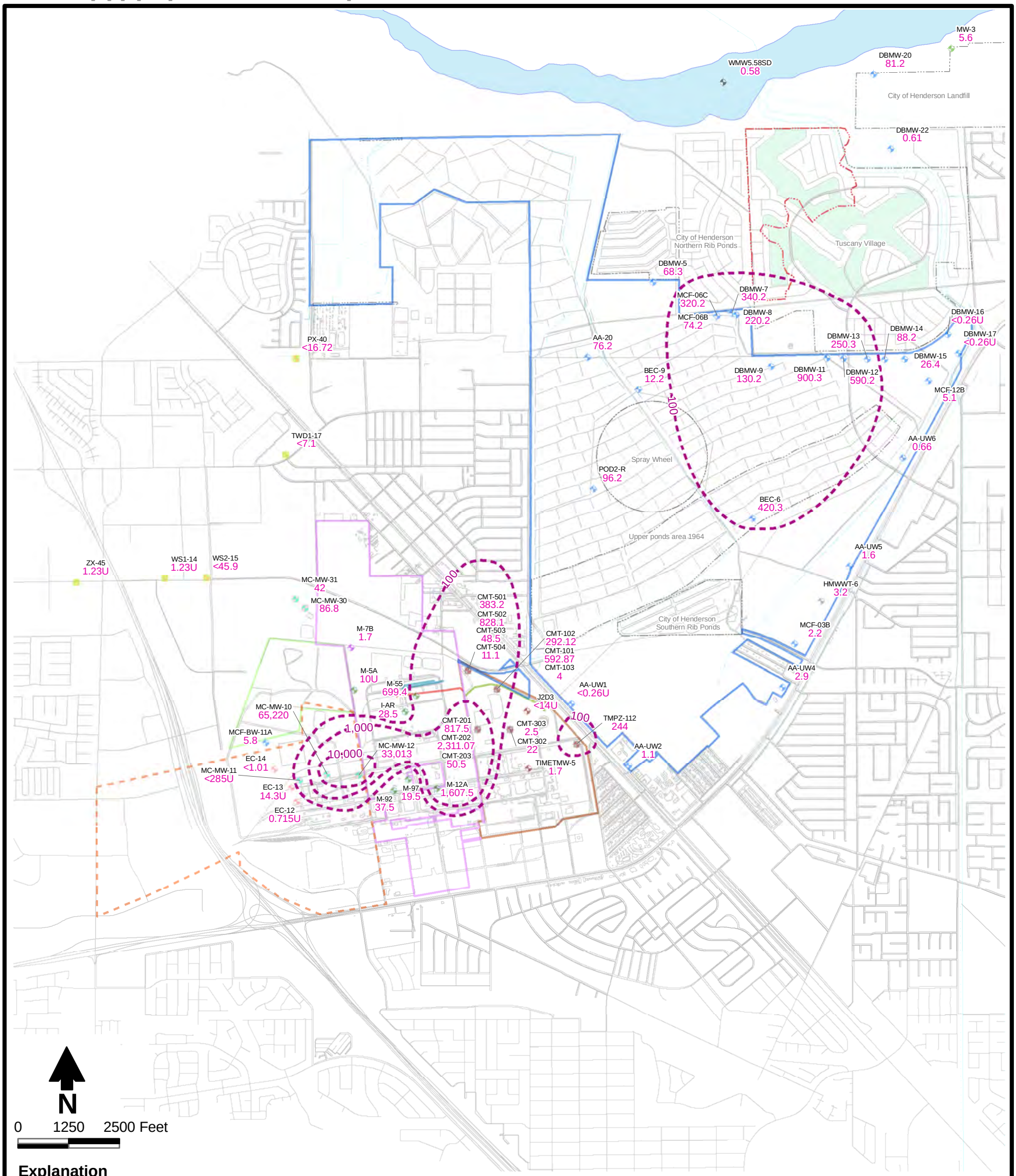
FIGURE G-21
TTHMs
Shallow Zone Layer 1

Daniel B. Stephens & Associates, Inc.
Basic Remediation COMPANY

Prepared by: DBS&A AFM
Date 05-03-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/TTHMS_LAYER1.MXD 013050

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/MODEL LAYERS 2010/TTHMS_LAYER2.MXD 016050



Explanation

Well Site - Date of Data

- Site not known - 2009
- AMPAC - 2004
- BRC - 2009
- City of Henderson - 2009
- Kerr-McGee - 2006
- Montrose - 2009
- SNWA - 2009
- Stauffer - 2009
- TIMET - 2006
- TIMET - 2008
- TIMET - 2009
- TRONOX - 2009

- Site boundary
- Gravel pit circa 1976 Source: Aerial photograph dated 1976
- TIMET boundary
- Tronox boundary
- POSSM (The Companies)
- Site AOC3 boundary
- Las Vegas Wash

- TIMET proposed slurry wall September 2008
- Tronox groundwater recharge trench
- Tronox slurry wall
- Street
- Concentration contour (dashed where inferred)

EC-13
3
Monitoring well designation
Result (ug/L)

BMI Common Areas (Eastside)
Henderson, Nevada

FIGURE G-22
TTHMs
Shallow Zone Layer 2

Daniel B. Stephens & Associates, Inc.

Basic Remediation COMPANY

Prepared by: DBS&A AFM

Date 05-06-10

S:/PROJECTS/BRC/ES09.0281_BRC_WH_AND_PRE-CSM_TASKS/GIS/MXDS/CHEMISTRY/LAYER_MODEL/TTHMS_LAYER2.MXD 013050